obstetric trauma surgery
art and science

kees llb stool fistulas
complex sphincter ani rupture

step-by-step reconstructive surgery

kees waaldijk
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national obstetric fistula center babbar ruga
katsina
nigeria
obstetric trauma surgery  
art and science  
setting standards by evidence-based practice  

kees IIb stool fistulas  
complex sphincter ani rupture  
step-by-step reconstructive surgery  

based on  
findings and outcome  

1,187 surgical and 227 nonsurgical procedures  
in 1,257 patients with kees IIb stool fistula  

out of  
5,100 procedures in 4,650 rectovaginal fistula patients  

kees waaldijk
obstetric trauma surgery
art and science

series of textbooks each with a specific topic
setting evidence-based standards

this series has been developed for setting evidence-based standards in the training and management of the obstetric trauma in all its forms in the low-, in the middle- as well as in the high-income world

the name of the series has been changed from obstetric fistula into obstetric trauma surgery since the fistula is only one aspect of the complex obstetric trauma

though a systematic approach is being followed this seems to be a utopia since the material is too extensive and it would take too long

each time a specific topic has been finalized it will be published as a separate entity; with later on an update if needed

then somewhere along the line a comprehensive summary will be produced in order to have a representative overview

the emphasis is placed on the functional anatomy of the pelvis, pelvis floor and pelvis organs, the female urine and stool continence mechanisms, the mechanism of action and the principles of reconstructive and septic surgery

for training reasons it will follow a step-by-step approach and repetition; together with schematic drawings and photographs

the whole series is based on kees archives of obstetric trauma with so far 29,000 reconstructive and conservative procedures in 25,000 patients with a rare “complete” documentation of each procedure and results as to healing and continence by electronic reports with 150 parameters, over 100,000 pre/intra/postoperative digital photographs, 30 hours of video recordings and a comprehensive database as personal experience over a 35-year period from 1984 up till now

as such it is considered to be a full scientific evidence-based report; though it has not followed the “you peer me, i peer you” doctrine

it is also not following the strict protocol of the international scientific journals or the so-called established theories; since only dead fish follow the flow of the river; and strict protocols kill any creativity; the message is not in the format

since it is the life work of the author it is written in his own words and in his own style

writing things down helps the author in organizing his own understanding and ideas
even as a trained and experienced colorectal surgeon the author found and still finds it
difficult to handle the rectovaginal/stool fistula in all its forms; with falling and standing up
over the years he developed a series of kess operation technique principles which he
would like to describe in detail
the complex trauma of the obstetric sphincter ani rupture continues to be a challenge to
surgeons all over the world
and, the results after surgery are not optimal partially because the functional anatomy is
complicated, the mechanism is poorly understood and the surgical skills are not always
up to standard
in the complex sphincter ani rupture there is a perineum tear as well but it certainly
should not be considered as a 4th degree perineum tear
in a compound bone fracture there is a skin tear as well, and nobody considers it as a 4th degree skin tear
the complex sphincter ani rupture is a cut-thru trauma and associated with a wide pelvis
and needs state-of-the-art reconstructive surgery of the anorectum, external sphincter
ani muscle, perineal body and posterior vagina wall
which is definitely not a perineorrhaphy like an osteosynthesis for a compound fracture
is not a cutaneorrhaphy
the complex sphincter ani rupture is a kess IIb stool fistula since there is an abnormal
epithelized connection between the anorectum mucosa and the vagina epithelium and/
or skin
however, there is a fluid transition from a perineum tear and from kess IIa into kess
IIb stool fistulas
out of the series obstetric trauma surgery; art and science this textbook
presents and outlines an evidence-based approach to the sphincter ani rupture as a
kees IIb stool fistula which has been used by the author in a prospective way; and as
backed up by extensive full documentation
this manual aims to guide the surgeon in his/her understanding of the complex trauma
of the obstetric sphincter ani rupture and the reconstructive surgery principles so that
the patient will be cured … and the surgeon will not be disappointed
kees waaldijk  md phd
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stool continence mechanism
4-5 cm distal anorectum

internal sphincter

external sphincter
introduction
kees IIb stool fistulas
complex sphincter ani rupture

within the kees classification the fistula which II does involve the anatomic stool conti
nence mechanism b with involvement of the external sphincter ani muscle is a kees
IIb stool fistula so after healing the continence may be compromised

the author considers the complete sphincter ani rupture a rectovaginal fistula since there
is an abnormal connection between the anorectum (mucosa) and the vagina
(mucosa/epithelium) and/or outside (skin)

so far, a grand total of 1,257 patients with a complex sphincter ani rupture were seen
out of whom 1,030 were operated and 227 were treated conservatively by the author

the great majority of 95% are due to obstetric trauma by a cut-thru of the fetal head thru
the maternal distal posterior vagina wall, perineal body, external sphincter ani, prerectal
fascia and anterior anorectum; and seldomly by pressure necrosis

whilst the remaining 5% have another traumatic cause like rough sex, impalement and
iatrogenic like yankan gishiri which all could be considered as a cut-thru as well; or the
cause is (necrotizing) infection

though spontaneous healing is possible, most patients need reconstructive surgery

up till today the fresh, intermediate or old obstetric sphincter ani rupture constitutes a
real challenge to the obstetrician and the surgeon, in the low- and middle-income world
as well as in the high-income world since it is a complex trauma

and it will continue to be so far into the future since even in the high-income world with
expert obstetric care prevention seems to be a utopia as the reported incidence of overt
sphincter ani rupture is 2-5% in vaginal deliveries

the major problem is that it looks so simple that even the most inexperienced doctor or
nurse dealing with obstetrics thinks (s)he can handle it: just a couple of sutures to close
the visible tear without paying attention to the different individual anatomic defects

partially to blame for this is the term 3rd of 4th degree perineum tear which places the
emphasis wrongly on the perineum instead of on the complexity of the trauma

however, the perineum is not the real problem and a few sutures to adapt the visible
gap in the perineum are certainly not sufficient to deal with this condition

even if there is some expertise then the surgeon concentrates upon the reconstruction
of the external sphincter though it is meticulous reconstruction of the internal sphincter
which is the most important

so, it is no surprise that the anatomic/cosmetic and functional postsurgical results are far
from optimal; many patients need constipating drugs
in contrast, the surgical repair requires ample theoretical and practical knowledge of the functional anatomic stool/flatus continence and support mechanism in the female; then understanding of the mechanisms of action (cut-thru trauma) and exact assessment/identification of all the individual lesions

combined with expert skills in reconstructive surgery of the anorectum, sphincter ani muscle and perineal body; whilst the principles of septic surgery have to be applied since there is always heavy stool contamination

besides this, the rectum, anus and external sphincter ani muscle are delicate tissues which have to be handled with care otherwise there will be a substantial iatrogenic trauma

actually, only if the surgeon masters the art & science of the obstetric trauma and reconstructive surgery (s)he will be able to deal confidently with this condition

since it is a cut-thru trauma and not the result of pressure necrosis there is no tissue loss; but there may be a substantial additional surgical trauma with tissue loss if the repair is not being performed lege artis; little knowledge and insufficient skills are dangerous

through continuous theoretic, clinical and surgical research and evidence-based results since 1984, the author developed a systematic reconstructive surgery approach with meticulous attention to detail keeping the additional surgical trauma to a minimum

however, though the obstetric anterior sphincter ani rupture with resulting stool/flatus incontinence are the majority there are more causes of stool/flatus incontinence which need to be addressed as well in order to present a comprehensive scientific study about stool and/or flatus incontinence

there are some patients with lateral sphincter ani trauma and patients with pressure necrotic posterior sphincter ani trauma

then there are patients with transient postpartum stool/flatus incontinence with pudendal nerve trauma (negative anal reflex and saddle anesthesia) and/or autonomic nervous system trauma

there is also a frequent combination with postpartum genuine urine incontinence and/or cervix prolapse as all these conditions are associated with a wide pubic arch and pelvis

the philosophy of reconstructive surgery is that once the functional anatomy has been restored under physiologic stress the normal physiology will be ensured

reconstructive surgery means one only reconstructs the functional anatomy, nothing more and nothing less; anything that is not in line with the functional anatomy will only make things worse; too little is harmful but too much is harmful as well

the reconstructive surgery principles are described in a step-to-step manner; and were applied as guideline in 1,173 operations in 1,030 patients

though the repair of these fistulas looks straightforward since good access in practice it turns out to be rather tricky
as demonstrated by the fact that already 68% or two-thirds of the patients had been operated from 1 to 12 times resulting in real mutilation in 20%, 13 patients were inoperable and 11 patients had a colostomy.

and that even in the author’s hands the failure rate at his first repair was 9% though the final healing rate was 97.5%, with an incontinence rate of 1% of the healed fistulas.

it is good to keep in mind that the surgeon cannot heal; the role of the surgeon is to restore the functional anatomy by bringing the right type of tissue together to the best of his knowledge, skills, experience and conscience and then leave it to the enormous regenerative power of nature for healing.

the anatomic stool continence mechanism in the female consists of the distal 4-5 cm of the anorectum with internal sphincter + external sphincter ani supported by the perineal body fixed anus as reference point for measurements.
complex trauma

sphincter ani rupture

reconstructed

sphincter ani rupture

reconstructed

sphincter ani rupture

reconstructed

© kees
complex trauma

sphincter ani rupture
\begin{itemize}
  \item tissue bridge
  \item sphincter looks intact but is not
\end{itemize}

\begin{itemize}
  \item tissue bridge severed
  \item now real trauma visible
\end{itemize}

\begin{itemize}
  \item reconstructed
\end{itemize}

\begin{itemize}
  \item small residual anterior defect
  \item looks intact but is not
\end{itemize}

\begin{itemize}
  \item residual anterior defect
\end{itemize}

\begin{itemize}
  \item reconstructed
\end{itemize}

\copyright kees
essentials
kees IIb stool fistulas
complex sphincter ani rupture

essentials stool fistula classification
kees Ia
kees Ib
kees Ic
kees IIa
kees IIb
kees III
postpartum stool/flatus incontinence

essentials stool fistula surgery

essentials kees IIb stool fistulas
II involvement of stool continence mechanism
b with external sphincter ani involvement
essentials kees classification of stool fistulas
based on tissue loss, continence mechanism and operation technique
with consequences for prognosis

any classification is a compromise considering the enormous variety of trauma
classification
the following classification is presented according to the anatomic/physiologic location
with consequences for operation technique only; see table I

kees I  fistulas not involving the continence/closing mechanism
kees II  fistulas involving the continence/closing mechanism
kees III miscellaneous

and of course  postpartum stool/flatus incontinence without a fistula

table I
classification of fistulas according to anatomic/physiologic location

kees I  not involving continence mechanism       proximal fistulas
  a  without rectum stricture
  b  with rectum stricture
  c  with circumferential defect

kees II  involving continence mechanism       distal fistulas
  a  without external sphincter ani involvement
  b  with external sphincter ani involvement

kees III miscellaneous, e.g. colostomy, ileouterine fistulas etc

this classification is based on the progressive quantitative and qualitative amount of
tissue loss and on involvement of the stool continence/closing mechanism

the transition from kees I into kees II fistulas is at 4-5 cm from the anus whilst for the
kees I fistulas a rectum stricture or circumferential defect has to be looked for

the proximal kees I fistulas are due to pressure necrosis with anatomic tissue loss; few
due to surgery

most of the distal fistulas kees II are due to a cut-thru mechanism without anatomic
tissue loss; including penetration trauma and surgical complications
a grading of involvement of the stool continence mechanism of the different types is presented in table II

**table II**
involvement of continence mechanism according to type

<table>
<thead>
<tr>
<th>type</th>
<th>involvement of continence mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>kees Ia</td>
<td>none</td>
</tr>
<tr>
<td>kees Ib</td>
<td>none</td>
</tr>
<tr>
<td>kees Ic</td>
<td>none</td>
</tr>
<tr>
<td>kees IIa</td>
<td>from minimum up to moderate</td>
</tr>
<tr>
<td>kees IIb</td>
<td>extensive</td>
</tr>
<tr>
<td>kees III</td>
<td>none</td>
</tr>
</tbody>
</table>

**results**
postrepair incontinence is not a major problem, though it may occur in kees IIb fistulas, whilst kees Ic fistulas have the worst results as to closure and may need a combined abdominovaginal approach; further, no clear relation to type

**comment**
so far it is the only classification with a solid scientific background

**clear operation technique principles** for each type

**prediction of outcome** in terms of closure and continence

not only the fistula has to be classified, but all the lesions/defects have to be objectively described/document in writing to be completely transparent

however, since the variety is so immense and there are no sharp demarcations but fluid transitions between the different types, this classification should be used as a comprehensive guideline since

each fistula constitutes a separate unique entity and needs its own specific customized approach, and that is exactly what makes obstetric fistula surgery so intriguing and challenging since there are no identical obstetric fistulas

**fistula size, vagina strictures, scarring, stenosis and/or previous repair(s)**
are no part of any classification; it only may make the operation more complicated
essentials rectovaginal/stool fistula surgery
operation principles for each type

<table>
<thead>
<tr>
<th>type</th>
<th>rectum closure direction</th>
<th>special measures</th>
<th>post vagina wall only half-open adaptation</th>
</tr>
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<tr>
<td>kees Ia</td>
<td>transverse</td>
<td>(+ colpotomy)</td>
<td>transverse</td>
</tr>
<tr>
<td>kees Ib</td>
<td>transverse</td>
<td>+ stricture disruption</td>
<td>transverse</td>
</tr>
<tr>
<td>kees Ic</td>
<td>circumferential end-to-end</td>
<td>colpotomy (+ stricture disruption)</td>
<td>transverse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>highly complicated</td>
<td></td>
</tr>
<tr>
<td>kees IIa</td>
<td>common sense transverse or longitudinal (+ perineal body)</td>
<td>transverse or longitudinal</td>
<td></td>
</tr>
<tr>
<td>kees IIb</td>
<td>longitudinal</td>
<td>+ sphincter ani + perineal body</td>
<td>1x transverse adaptation</td>
</tr>
</tbody>
</table>

kees III special class of its own that needs their own specific approach

comments
these are only guidelines and the approach has to be customized since each fistula constitutes its own unique entity

there is a clear relation between the reconstructive surgery principles and fistula type in order to reconstruct the functional anatomy

there is no relation between fistula type and outcome; only that kees Ic fistulas are the most complicated with the worst outcome whilst postrepair incontinence may only occur in kees IIb fistulas

kees IIb fistulas need thorough theoretic/practical knowledge of the stool continence mechanism, otherwise the results will be poor

the author has never performed a colostomy for his obstetric trauma surgery; which would automatically mean at least 3 operations
essentials kees IIb stool fistulas

characteristics
the **kees IIb** fistulas comprise a group of fistulas which do involve the anatomic stool continence mechanism **with** involvement of the external sphincter ani muscle

roughly 95% are due to obstetric trauma out of whom roughly 50% are combined with a vesicovaginal fistula whilst the other 5% have another cause like penetrating trauma, yankan gishiri

there is an enormous variety also within the **kees IIb** class and each fistula constitutes its own specific entity which needs its own customized approach

with a fluid transition from perineum tear and from **kees IIa** into **kees IIb** stool fistulas

mechanism of action
cut-thru trauma of the fetal head thru the distal posterior vagina wall, perineal body, external sphincter ani, prerectal fascia and anterior anorectum wall; so, no anatomic tissue loss
    or
pressure necrosis of the soft tissues in between the fetal skull and the maternal sacrum and/or coccyx bone; so real anatomic tissue loss from minimal to extensive
    or
trauma like rough sex, episiotomy, yankan gishiri, other surgery, caustics
    or
infection
    or
congenital

reconstruction
the vagina is the route of choice since it is the most logic and least traumatic approach with good visibility of and good access to the operation field

longitudinal anorectum closure, end-to-end sphincter ani reconstruction and perineal body repair are in line with reconstructive principles

whilst the posterior vagina wall is only adapted 1x in line with septic surgery principles since the operation field is always heavily contaminated

prognosis
due to traction upon the repair by different mechanisms the closure rate of the **kees IIb** fistulas is compromised though in the end it is good whilst the continence rate of the closed fistulas is excellent if the anorectum has been repaired up to the anocutaneous junction
kees IIb

longitudinal rectum closure
sphincter reconstruction
postpartum stool/flatus incontinence

different possibilities

mechanism of action
  cut thru
  necrosis
  neurogenic

tear/necrosis posterior vagina wall

perineum tear

complex sphincter ani rupture

neurogenic
  obstetric
  nonobstetric
postpartum stool/flatus incontinence
mechanism of action
possibilities

introduction

there are several causes of postpartum stool/flatus incontinence and the first priority is to identify the true nature and to find out if it needs reconstructive surgery or not

besides having a comprehensive knowledge of the functional anatomy, the surgeon needs to understand as well the mechanism of pathophysiologic action; only then a plan of reconstructive action can be devised which makes sense

mechanism of action

in postpartum stool/flatus incontinence there are several possibilities:

- anterior sphincter ani rupture
- anterolateral sphincter ani rupture
- posterior sphincter ani rupture
- anterior or lateral sphincter ani trauma due to episiotomy or instrumental delivery
- distal posterior vagina pressure necrosis interfering with the continence mechanism
- trauma to pudendal nerve and/or autonomic nervous system

anterior sphincter ani rupture

it is good to realize that the complex obstetric sphincter ani rupture is normally an anterior cut-thru trauma and not due to pressure necrosis so no tissue loss; frequently in combination with a wide pubic arch $\geq 90^\circ$

it is due to precipitous labor (of the head) whereby the tissues have no opportunity to stretch and the fetal head cuts thru the “stiff” tissues in following order

- posterior vagina wall = pvw
- perineal body
- external sphincter ani
- prerectal fascia
- anterior anorectum

so, the possibilities are as following

- only pvw trauma
  - no need for action only if exceptionally continuing bleeding profusely

- pvw trauma combined with (partial or total) perineal body rupture; if total perineal body rupture there is no longer median resp posterior union of transversus perinei resp bulbo spongiosus muscles as well
  - this will also heal spontaneously but may need some adaptation sutures immediately post partum
pvw trauma and total perineal body rupture combined with (partial or total) anterior external sphincter rupture
this may heal as well spontaneously with reunion of the transversus perinei and bulbospongiosus muscles but adaptation sutures may be applied immediately post partum

pvw trauma, total perineal body rupture, total anterior external sphincter ani rupture combined with prerectal fascia/anterior anorectum rupture
then the ruptured sphincter (ends) retracts bilaterally and into the vagina; also the bulbospongiosus muscles and transversus perinei muscles retract since they are no longer united in the median via the perineal body
this needs expert reconstructive surgery of all the defects either immediately post partum or as a delayed procedure

anterolateral sphincter ani rupture
exceptionally childbirth takes place thru the ischiorectal fossa and may rupture the posterior vagina wall, perineal body, sphincter ani and prerectal fascia/anorectum anterolaterally and needs to be treated according to the same surgical principles as in total anterior sphincter ani rupture
the author operated successfully upon only 2 patients so far; as well successfully as second stage upon 1 patient with lateral sphincter ani trauma due to incision of perianal abscess; after first stage revision of wound

posterior sphincter ani rupture/trauma
rarely the posterior sphincter ani muscle has been traumatized probably due to pressure necrosis between the fetal head and the coccyx; with slight retraction of the sphincter ani endings but no retraction towards the coccyx bone
so far, the author saw 17 patients out of whom 4 had an anterior sphincter rupture as well; and only 4 patients needed sphincter repair, the others were fully continent

anterior or lateral trauma due to episiotomy
several patients were seen complaining of immediate postpartum stool and/or flatus incontinence with either a median episiotomy or a mediolateral episiotomy next to the sphincter ani
by spontaneous healing or by repairing the episiotomy all the patients gained full stool and flatus continence

deep posterior vagina wall pressure necrosis without fistula formation
several patients were seen with postpartum stool/flatus incontinence in combination with pressure necrotic distal pvw trauma; once this healed without fistula formation spontaneous healing followed
the necrosis with resulting tissue function loss is interfering with the physiologic functioning of the continence mechanism

neurogenic postpartum stool/flatus incontinence
this is a frequent occasion immediately post partum; since we check systematically for anal reflex as a function of pudendal nerve action, if this is negative we check for saddle an/hypesthesia as well and ask for stool/flatus continence
it is important to check the anal reflex bilaterally since one side may be negative (with half saddle anesthesia) whilst the other side is positive
normally this condition heals spontaneously within 2-3 months after labor; however, very infrequently it may persist
**additional iatrogenic trauma**

there may be substantial additional iatrogenic trauma with tissue loss if the complicated reconstructive surgery is nor performed lege artis

since the author is working in referral centers where the great majority > 90% of the patients have been operated at least once, the whole scale of additional trauma was encountered and varied from minimal to extensive with real mutilation

**note:** whatever the amount of additional trauma good results can still be obtained if one first assesses the trauma in detail and then sticks to the principles of reconstructive surgery and proceeds step by step systematically

**discussion**

though the great majority of the patients are due to poor obstetric practice, the author operated upon other patients with different causes as well

such as traumatic like sexual intercourse, impalement and other traumata including the yankan gishiri as well as infectious; the principles of reconstruction remain the same

in principle there is no tissue loss in the obstetric sphincter ani rupture; however, there may be substantial additional trauma with tissue loss due to surgery by incompetent doctors or other persons in order to do something; half knowledge is dangerous

in pressure necrotic distal pvw trauma the continence mechanism is impaired leading to stool/flatus incontinence; once it heals spontaneously (trauma not full thickness?) full stool/flatus continence returns; if a fistula develops (trauma full thickness?) an operation is indicated

in the neurogenic type of stool/flatus incontinence special attention has to be given to exclude spina bifida

exceptionally the trauma is due to extensive pressure necrosis with extensive tissue loss in combination with other extensive lesions which make it unrepairable
complex trauma

only perineum rupture with stool/flatus incontinence

blow-out fistula

sphincter ani rupture with cystocele

anterior sphincter defect from 11 to 1 o’clock

sphincter ani rupture vulva gangrene

sphincter ani rupture ischiorectal fossa gangrene at left

© kees
complex trauma

- wide pubic arch
- foot drop
- foot drop
- voluntary muscle testing = vmt
- post-eclampsia/stroke
- saddle anesthesia at left
- atonic bladder
  visible stool incontinence

© kees
complex trauma

delivery of infant thru ischiorectal fossa at right

lateral sphincter rupture after incision of perianal abscess

tissue bridge still sphincter rupture

sphincter ani rupture total 3º cervix prolapse

carcinoma

carcinoma

© kees
sphincter ani rupture
kees IIb stool fistulas
complex sphincter ani rupture

II fistulas involving continence mechanism
b with external sphincter ani involvement

characteristics
  mechanism of action
  characteristics

reconstructive surgery
  step-by-step reconstruction

discussion
kees IIb stool fistulas
complex sphincter ani rupture
II fistulas involving continence mechanism
b with external sphincter ani involvement

introduction
the kees classification is based upon the quantitative and qualitative amount of tissue loss and on the involvement of the anatomic stool continence mechanism in the female with consequences for the operation technique and prognosis

the fistula which II does involve the anatomic stool continence mechanism and b with external sphincter ani involvement is a kees IIb fistula

also within this kees IIb class the variety is enormous

there is a fluid transition from perineum tear and from kees IIa into kees IIb fistulas

trauma mechanism
almost exclusively a cut-thru trauma in the following order thru
distal posterior vagina wall
perineal body and skin
anterior external sphincter ani muscle
prerectal fascia
anterior anorectum wall

nb by rupture of the perineal body the (in)direct median union of the bulbocavernosus and transversus perinei muscles has been disrupted as well

some 95% are caused by obstetric trauma

normally, cut-thru trauma of the fetal head thru the maternal distal posterior vagina wall, perineal body, anterior external sphincter ani, prerectal fascia and anterior anorectum wall; so, no anatomic tissue loss

or
seldomly, pressure necrosis of the soft tissues in between the fetal skull and the maternal pubis, ischium, sacrum and coccyx bones resulting in extensive anatomic pelvis soft tissue loss; or pressure necrosis in between the fetal skull and maternal coccyx bone resulting in posterior sphincter ani rupture with minimal anatomic tissue loss

or
combination of the two

or
instrumental by vacuum or forceps delivery

or
episiotomy during delivery
precipitous labor of the head thru “stiff” perineum outlet
normally during childbirth in the outlet stage the head of the infant will repeatedly dilate
and stretch the perineum outlet for an “easy” passage of the infant

however, if this process goes too quickly, like in precipitous labor, the perineum outlet is
not stretched/dilated sufficiently and then the head of the infant may cut thru the “stiff”
perineum tissues

theoretically, the wider the pelvis and pelvis outlet the easier childbirth will take place;
however, without the benefit of repeated dilatation and stretching of the perineum

a pubic arch of ≥ 90° is an indication of wide pelvis and wide pelvis outlet and in the
author’s experience most of the time the anterior sphincter ani rupture is combined with
a wide pubic arch; whilst the combination with a narrow pubic arch is uncommon

nb even in prolonged obstructed labor with resulting pressure necrosis there may be
precipitous labor of the head of the infant thru the perineum outlet resulting in external
sphincter ani rupture without tissue loss after the initial mechanical real obstruction
has been “managed”

some 5% have a variable different cause

normally isolated

penetrating trauma like rough sex, impalement

or

iatrogenic like vaginal surgery, yankan gishiri

or

infectious like postmeasles noma vaginae, lgv, necrotizing infection, abscess

or

congenital like ectopic anus

additional trauma mechanism

though normally there is no necrotic anatomic tissue loss, reconstructive surgery may
result in iatrogenic anatomic tissue loss

typical inverted V configuration

this configuration is caused by

a bilateral displacement of the ruptured perineal body (transversus perinei muscles)

and

b circular retraction of the ruptured external sphincter ani muscle

and

c “circular” retraction of the ruptured internal sphincter/anorectum

and

d posterior displacement of the sphincter ani endings into the vagina

by longitudinal retraction of the ruptured anterior internal sphincter/anorectum
strange finding
in 64 of the patients the index delivery was ended by cesarean section; in 14 even in their first and only delivery

an explanation may be that an instrumental delivery had been tried or some other weird practices as noted in another patient who underwent a cs though the head of the infant was already fully out

characteristics complex sphincter ani rupture
in Kees Ilb fistulas there is a cut-thru rupture of the posterior vagina wall, the perineal body/skin, the external sphincter ani muscle, the prerectal fascia and the anterior internal sphincter/anorectum

with disruption of the median (in)direct union of the transversus perinei muscles and disruption of the posterior (in)direct union of the bulbocavernosus muscles

with the typical inverted V configuration

the cut-thru fistulas are frequently associated with a wide pelvis as indicated by a wide pubic arch of ≥ 90°

and may be combined with postpartum genuine urine stress incontinence and/or cervix prolapse; both also associated with a wide pubic arch

the fistula size may vary from small to medium to large to extensive

spontaneous healing during the first 1 to 2 months immediately after delivery is possible but most patients need reconstructive surgery

few patients tell it is not bothering them and refuse an operation since they claim total stool/flatus continence

reconstruction see special chapter
the reconstructive surgery in Kees Ilb stool fistulas looks straightforward but turns out to be highly complicated with poor results as to healing and continence if not executed in line with the functional pelvis anatomy

the reconstruction takes place in the opposite order of the cut thru trauma, so first the anorectum/internal sphincter with prerectal fascia, then the external sphincter ani, then the perineal body/skin and lastly the posterior vagina wall

the author prefers the end-to-end external sphincter ani reconstruction since that is the physiologic solution

the overlapping repair is nonphysiologic and requires more dissection and dissection of the external sphincter from the internal sphincter; so more additional surgical trauma

at the end of the operation everything should look normal; if not, something is wrong and this has to be corrected
discussion

the kees llb stool fistula is a rather common finding accounting for some 25% or one-quarter of all the rectovaginal fistulas as encountered by the author

roughly 95% are due to obstetric trauma whilst 5% have another cause, at least in the author’s experience

almost all 100% are due to a cut thru trauma, so originally no tissue loss; though there may be anatomic tissue loss due to previous repairs which also may result in mutilation as encountered in 20% of the operated sphincter ruptures

though the mechanism of action may be the same and the perineum is affected in both, the complex sphincter ani rupture is definitely not a perineum tear

a perineum tear is not a fistula but only just a tear in the posterior vagina wall, skin and perineal body with or without slight dehiscence which will heal with or without a few adaptation sutures; and may be associated with transient stool/flatus incontinence until healed

whilst the sphincter ani rupture is a complex trauma involving the posterior vagina wall, the perineal body and skin, the external sphincter ani muscle, the prerectal fascia, the internal sphincter/anorectum, the bulbocavernosus muscles and the transversus perinei muscles

the complex sphincter ani trauma is a fistula since there is an abnormal epithelialized connection between the anorectum mucosa and the vagina epithelium and/or skin

calling the complex sphincter ani rupture a 4th degree perineum tear is like calling an open compound fracture a 4th degree skin tear; though there is also a skin tear

calling the state-of-the-art reconstruction of the sphincter ani rupture a perineorrhaphy is like calling an osteosynthesis for a compound fracture a cutaneorrhaphy

healing after repair may be a bit problematic since there is real traction on the repair site from different structures/directions; but, once healed, normally there is full stool/flatus continence, at least in the author’s experience

personal experience of the author with 1,257 consecutive patients out of whom 1,030 were operated; the other 227 patients were treated conservatively
stool continence mechanism
4-5 cm distal anorectum

frontal

sagittal
kees IIb stool fistulas
complex sphincter ani rupture
preoperative care

history

assessment

preoperative remarks

instruments etc
history, assessment and preoperative remarks

introduction
before one starts with the surgery it is a must to take a proper history and to examine
the patient properly and to identify all the individual lesions and make up a plan of action
how to proceed with the reconstruction of the functional anatomy

history
history taking is of paramount importance in medicine and will provide a wealth of
information if done properly

marital status
  single, married, separated or divorced
what kind of incontinence
  stool, flatus or both
  combined yes/no with urine incontinence
duration of condition
  how many days, months, years
menstruation
  yes/no, postmenopausal
obstetric or nonobstetric
  is there is correlation with obstetrics
other complaints
  leaking urine
  prolapse

if obstetric
then the following has to be asked
parity
  how many deliveries
how many alive
  of the children born
index parity
  at which delivery did it happen
duration of index delivery
  how many hours, days
number of infants at index delivery
  single, twin, triplets
sex of index infant
  male/female
condition of index infant
  stillborn, born alive/died later, alive
place of index delivery
  at home or in hospital
mode of index delivery
  spontaneous, assisted vaginal, instrumental by forceps or vacuum, or cesarean
section ((sub)total hysterectomy))
when did it start after index delivery
  immediately or after how many days
eclampsia with fitting
  yes/no
if nonobstetric
    then the following has to be settled
congenital
    like spina bifida
trauma
    what kind of trauma (besides obstetric)
neurogenic
    spina bifida, sacral plexus trauma
infection
    lymphogranuloma venereum, abscess
malignancy
    in advanced stage
radiation
    for what
eclampsia during one of her pregnancies
    yes/no

**preoperative assessment** at first visit

general condition
    good, fair, poor; and check for (an)emia
confirm the lesion
    yes/no
tissue quality
    necrosis, infected (with pus), inflamed, granulations etc
anal reflex both sides as pudendal nerve function
    if negative or slightly positive test for (half) saddle hyp/anesthesia
ulcers
    pre-tuberosity ulcers (cave saddle anesthesia)
foot drop
    vmt of both legs as peroneus nerve function
assess for urine fistula as well
    in large proportion there is combination with
    vvf and/or genuine intrinsic incontinence and/or prolapse
based upon these findings
    set a date for surgery
    make provisional plan of action

**exact assessment under anesthesia just before starting surgery**

pubic arch in degrees
    in the majority one will find a wide pubic arch of \( \geq 90^{\circ} \)
vagina length in cm
    normally 10-12 cm
condition of vagina
    normal, stricture, stenosis, local scarring, fibrosis, shortening
trauma to the posterior vaginal wall
    assess the amount of trauma
trauma to the perineal body
    how far disrupted
trauma to the external sphincter ani
    identification of the sphincter endings at clockwise position
    if there is tissue loss (especially after previous repair)
    anterior, (antero)lateral or posterior
trauma to the anorectum
    longitudinal defect in cm
trauma to labia
    labia intact or not
look for signs of previous surgery
    sutures, suture marks, tissue loss
identify position of posterior anus
    normally in anatomic position due to anococcygeal ligament
quantify tissue quality
    good, medium, poor
look for accompanying trauma
    vesicovaginal fistula
    proximal rectovaginal fistula
    genuine intrinsic incontinence
    cystocele
    2° or 3° cervix prolapse
    foot drop

then make final plan of action and proceed with the reconstruction

preoperative remarks
the major problem is that it looks so simple that even the most inexperienced doctor or nurse dealing with obstetrics thinks (s)he can handle it: just a couple of sutures to close the visible tear without paying attention to the different individual anatomic defects

partially to blame for this is the term 3rd of 4th degree perineum tear which places the emphasis wrongly on the perineum

however, a couple of sutures to close the visible gap are certainly not sufficient and the surgical reconstruction requires ample theoretical and practical knowledge of the anal continence mechanism in the female combined with expert skills in reconstructive surgery of the anorectum, sphincter ani muscle and perineal body according to exact assessment/identification of all the individual lesions whilst the principles of septic surgery have to be applied since there is always heavy stool contamination

normally, there is no tissue loss since it is a cut-thru trauma; however, since most referred patients have been attempted at least once by inexperienced surgeons there may be (extensive) additional surgical trauma with anatomic tissue loss

despite extensive training and expertise in colorectal, general, traumatic, septic (war and leprosy), obstetric, gynecologic, head/neck; breast, vascular and reconstructive surgery, it took the author 20 years to come up with a final concept for the treatment of sphincter ani rupture

through continuous theoretical, clinical and surgical research and evidence-based results since 1984, a systematic reconstructive surgery approach has been developed with meticulous attention to detail keeping the additional surgical trauma to a minimum though the final concept principles have been settled, there is still a continuous process of perfection going on; forever
normally a one-stage procedure is sufficient to achieve good results; but in extensive trauma it may be better to perform a two-stage procedure whereby first the anorectum with internal sphincter is repaired, and if needed the external sphincter complex is reconstructed as second stage

the aim is to achieve a lasting excellent anatomic/cosmetic and physiologic result, everything should look normal/fine and function normally with complete stool/flatus continence and healthy sex life

preoperative care
preparation
preparation of the patient by clinical check of general health and (an)emia

operation indication
the reason for the operation is established like in any other procedure since there are several patients with “asymptomatic” complete sphincter ani rupture (and even rather large anorectum trauma) who claim to be completely continent for stools/flatus and refuse operation

timing of operation
timing of operation: as soon as the wounds are clean the patients is considered to be suitable for operation unless her general condition does not permit it if overt infection sitzbaths with water and a detergent like omo (cheap and available and highly effective) 3 times daily for 20 minutes until wound is clean since the principles of septic surgery are being applied tissue inflammation itself is no contraindication

no pre-, intra- and/or postoperative antibiotics = leaking umbrella
though the operation site is always heavily contaminated routine antibiotics are not given; they will only contribute to multi-resistance

patient consent
any patients is asked by the surgeon himself if she wants and agrees to be operated or not; a written consent is obtained as well

instruments and suturing material
two strong needle holders
blade holder for scalpel no 11
scalpel no 11
sharply curved pair of thorek scissors
surgical forceps
a set of small mosquito hemostats
two different sizes of strong curved needles; small ga 314/7 and large ga 414/5 p2
absorbable suturing material like polyglycocolic acid
hegar dilators size h5-6, h7-8, h9-10 and h11-12
nia (katsina) female 17 yr 08.11.07

diagnosis: PI (0 alive), overflow incontinence due to atonic bladder, necrotic septic sphincter ani rupture with anorectum trauma, leaking urine/stool/flatus incontinence for 11 days which started immediately following obstructed labor for 1 day, at home SB female, married 3 yr ago post (menarche 8 mth earlier), not living with husband, no menstruation, drop foot R (grade 4) and L (grade 4), no yankan gishiri; normal AP diameter/pubic arch 90°, AR neg with saddle anesthesia no sign of puerperal sepsis

necrotic septic lesions vulva/labia minora/labia majora R > L

no avw trauma 154.5 cm

08.11.07 suprapubic mass, avw bulging into vagina, bladder overdistended (EUO/BW 18 cm), moderate anterior elevation after draining > 750 ml of urine, EUO/B 1 cm (vesicalization) FOLEY Ch 18; free urine flow increased bladder capacity (longitudinal diameter 18-1 = 17 cm, atonic bladder)
poor position of UV-junction against caudad third of symphysis normal-width 1 cm good-quality urethra_euo in anatomic position debridement sitzbaths with detergent 3-4x daily

17.11.07 debridement R labia documented
24.11.07 healing documented
18.01.08 wound almost healed documented
24.02.08 operation: sphincter ani rvf 932
12/13.07.08 insp/ everything nicely healed documented
full urine/stool/flatus continence, not leaking at all AR pos, no saddle anesthesia

13.05.09 amenorrhea for 4 mth not leaking at all, stools ok instructions
pt 718 katsina severe necrotic (fournier gangrene) vulva lesions rvf 932 cath 1096
nia (katsina) female 17 yr 24.02.08
surgeon: kees waaldijk
assistant: mamman audu
diagnosis: PI (0 alive), severely mutilated inflamed sphincter ani rupture with 2 cm longitudinal anorectum trauma, stool_flatus incontinence for 4 mth which started immediately following obstructed labor for 1 days, at home SB female, married 3 yr ago post(menarche 8 mth earlier), not living with husband, no menstruation, drop foot R (grade 5) and L (grade 5), no VVF, no yankan gishiri; normal AP diameter/pubic arch 90°, AR neg with real saddle anesthesia vulva lesions healed immediate suturing pp I/F 0 cm type llb
operation: anorectum closure and sphincter ani perineal body reconstruction duration: 20 min (step-by-step teaching) healing 85% continence 95%
anesthesia: spinal L4/L5 with 3 ml bupivacaine 0.5%
incision at pvw edge, sharp dissection, mobilization of pararectal anal tissue, longitudinal anorectum closure with adaptation rhaphy of internal sphincter over 2.5 cm up to anocutaneous border by double layer of inverting interrupted/continuous serafit, inner ring of external sphincter ani adapted, end-to-end external sphincter ani reconstruction by 2x serafit, perineal body repair by 2x serafit, perineum “adapted”, pack FOLEY Ch 18; free urine flow, EUO/BW 13 cm, moderate elevation, EUO/B 2 cm severe inflammation 12/13.07.08 full stool/flatus continence, not leaking at all healed documented 13.05.09 amenorrhea for 4 mth not leaking at all, stool ok instructions

preanesthesia: 140/80 mm Hg
5': 130/80
10': 120/70
postoperation: 120/70
sphincter ani rupture
atonic bladder
extensive gangrene
day 11 post partum
day 11

day 20
after sitzbaths
repeat debridement
day 20

effort
almost clean
almost clean

© kees
reconstructive surgery principles
kees IIb stool fistulas
complex sphincter ani rupture

surgical principles
rectovaginal fistulas

kees IIb stool fistulas
step-by-step reconstruction
additional surgery
discussion

related conditions
surgical principles for rectovaginal fistulas
in line with principles of septic surgery
since the vagina is never sterile

introduction
the main objectives of any (obstetric) fistula repair are:
  aa to close the fistula
  bb to make the patient continent and
  cc to preserve or to provide her with something for sexual intercourse
if these three objectives have been achieved the patient will be rehabilitated completely
into her own society; this will take place spontaneously without further measures

patient consent
any patients is asked by the surgeon himself if she wants and agrees to be operated or
not; a written consent is obtained as well

timing of operation
timing of operation: as soon as the wounds are clean the patients is considered to be
suitable for operation unless her general condition does not permit it
if overt infection sitzbaths with water and a detergent like omo (cheap and available and
highly effective) 3 times daily for 20 minutes until wound is clean
since the principles of septic surgery are being applied tissue inflammation itself is no
contraindication

preoperative bowel preparation
though it is nice to have an empty rectum somehow it seems not possible to organize
mechanical bowel cleansing: too early, too late or not at all or by patient to patient; or
whatever, it is not functioning
in severe rectum stricture the proximal loop cannot be cleansed by enema and the
author has experienced serious complications by forceful enemas thru distal colostomy
in case of stool impaction into the distal colostomy loop up to severe rectum stricture not
noticed during the enema and then sent to operating theater with stool still impacted and
contaminated enema fluid transudation thru the traumatized sigmoid wall into the
peritoneal cavity
therefore, the patient is instructed to stop eating the night before and to pass stools the
morning of operation day

routine pre-, intra- and post-operative antibiotics as prevention of what??
in septic surgery routine antibiotics are considered malpractice
the author is not against the powerful working of antibiotics but only on real indication
and only then it makes sense
nb if routine antibiotics would really work (as predicted) one would no longer see post
operative wound infection and sepsis
instead this practice contributes to the ever increasing pandemic of antibiotic multi-
resistance in a circulus vitiosus due to the financial lobbying of the drug makers, the fear
of litigation and not to forget the vocal demand by the patients
**manpower**

fistula surgery is a one-man job, and all the operations are performed by the surgeon and one assistant who is doing the instrumentation; one retractor inside the vagina is already a crowd

**anesthesia**

spinal anesthesia with a long-acting drug is the anesthesia of choice

**route of operation**

the vagina is the route of choice

some surgeons prefer the combined abdominovaginal approach for kees Ic fistulas

**position**

the exaggerated lithotomy position with the buttocks over table end and legs flexed and abducted in leg holders is the position of choice

though some surgeons prefer the head up/buttocks down position for kees II fistulas

**instruments**

normal (long) vaginal surgery instruments are needed together with the following special instruments: a) auvard weighted speculum for keeping the vagina open, b) long allis clamps for picking up the vagina or rectum edges, c) a pair of sharply curved thorek scissors for dissecting the posterior vagina wall from the prerectal fascia/rectum besides, a complete well-functioning hydraulic operation table is of utmost importance and a must

**suturing materials**

normal resorbable polyglycolic acid size 00 and 0 and nonabsorbable nylon sutures size 1 and 2 are needed with a strong small curved needle

**concentrate upon rectum closure**

since the rectum is a high-pressure organ and the vagina a zero- or low- pressure organ once the rectum has healed, the posterior vagina wall will always heal therefore, concentrate upon the meticulous rectum closure and only adapt the posterior vagina wall or leave it half open in line with septic surgery

**two-layer rectum closure**

in principle

the rectum is closed in two layers, the first interrupted and the second continuous, by inverting sutures for strength since the rectum cannot be decompressed and for flatus-proof closure otherwise there may be contamination when flatus should pass thru the small openings in between the interrupted sutures in case of rectum distension by gas

**intraoperative stool contamination**

cleanse it with abundant clean water since the solution to pollution is dilution and leave the pvw completely open or half open after rectum closure in order to prevent abscess formation and breakdown

**intraoperative antibiotics**

on indication

if there is stool contamination with large wound area or after sharp disruption of rectum stricture the author gives tinidazole orally and one shot broad-spectrum antibiotic im in order to prevent endotoxin shock/septicemia since the bacterial contamination is sucked up by the open veins into the general vascular circulation
transverse posterior colpotomy with opening of abdomen
for the proximal kees Ia/Ib fistulas a transverse posterior colpotomy is not necessary but may facilitate the tension-free rectum closure; however, with risk of intraperitoneal contamination
in kees Ic fistulas a transverse posterior colpotomy is obligatory in order to perform (adapted) circumferential dissection plus (adapted) circumferential end-to-end rectosigmoidectomy
if a colpotomy has been performed the abdomen has to be closed proximally from the repair to prevent intraperitoneal contamination if the repair should break down in severe funnel-shape shortening (ba hanya) a colpotomy is performed to facilitate the repair and to reconstruct a neovagina in the same session

grafting
there is no need for grafting; reconstruction of the functional pelvis anatomy will be sufficient, ie meticulous rectum closure that is the decisive factor

combination rectovaginal fistula with vesicovaginal fistula
in one session
only if it is not too complicated and both can be done within a reasonable time frame; it is better to do them in two sessions than to compromise both in one session
in the proximal kees Ia and Ib fistulas the stool fistula should be closed first in order to prevent intraoperative stool contamination
kees Ic fistulas are so complicated that it is not advisable to combine them with the repair of a vesicovaginal fistula
in the distal kees IIa and IIb fistulas the vesicovaginal fistula should be repaired first otherwise access to the operation field may be compromised which is excellent in the kees IIb fistulas
in two sessions
in principle the vvf is repaired in the first session since that is the wish of the patient in most cases
and if successful the rvf can be done in the second session however, when the patient wishes it the other way the rvf is done first
nb a rvf does not interfere with the healing of a vvf-repair in the author’s experience

primary suturing of small kees Ia fistulas
in small proximal kees Ia fistulas near or at cervix/vault a freshening is made of the fistula edge and then only pvw closure (onto posterior cevix) is performed in an everting donati manner resulting in inverting good adaptation of the rectum; with good results however, make sure there is no rectum stricture
in small proximal kees Ib fistulas the same can be done; but then posterior disruption of the rectum stricture has to be performed; the results are moderate to good

delicate rectum tissue
the rectum tissue is rather delicate and has to be handled with care

prerectal fascia + muscularis
in closure of the fistula it is the prerectal fascia/muscularis which is picked up by the needle/suture whilst the mucosa will be adapted on tying the sutures theoretically and in principle the needle should not go thru the rectum lumen but that is not always avoided and actually without negative effect upon healing
check on rectum closure
by vaginal visual inspection and intrarectal digital examination

half-open posterior vagina wall adaptation
in line with the principles of septic surgery since the vagina is never sterile in order to avoid abscess formation and breakdown
once the high-pressure rectum has healed, the posterior wall of the low-pressure vagina will always heal

large defects in the posterior vagina wall
can be left open for natural secondary epithelization whereby the superficial layer of the prerectal fascia will epithelize into vagina epithelium or can be filled up by different kinds of skin flaps

decompression
to avoid tension on sutures/repair
though after vvf-repair complete decompressions of the bladder can be ensured by an indwelling catheter
it is not possible to achieve this of the rectum, even with colostomy, so from time to time there will be (high) tension on the sutures/repair by gas/flatus and stools; and stool softeners are indicated to promote smooth fecal propulsion and smooth defecation
this explains the fact that the postoperative breakdown rate in rectovaginal/stool fistulas is higher than in vesicovaginal/urine fistulas

colostomy = iatrogenic colocutaneous kees III fistula
the rationale for colostomy in abdominal colon surgery is proximal decompression in order to prevent tension on the sutures with the possibility of breakdown with contamination of the peritoneal cavity as a life-threatening complication
however, complete continuous decompression is not guaranteed since stool may still enter the distal colostomy loop with high pressure inside the distal loop and eventual defecation thru the anus; in combination with stool thru the functioning colostomy in rectovaginal fistula surgery where the repair and sutures are outside the abdomen the repair may break down but no stool contamination of the peritoneal cavity; so not a life-threatening complication
a colostomy means automatically 3 operations: colostomy, after functioning of colostomy the rvf-repair and after objective fistula healing colostomy closure
the author has never performed a colostomy in his obstetric trauma surgery, still with good results
however, stool softeners are indicated to minimize straining on defecation

traction on repair by fixed/moving cervix
since the fixation of the prerectal fascia onto the posterior cervix is via the vault, there is hardly any traction on the repair/sutures by the cervix
so this is not a factor in the healing process of a rectovaginal/stool fistula; unlike in vesicovaginal/urine fistulas

principles of surgical technique(s)
the vaginal approach is the route of choice with or without unilateral, median or bilateral episiotomies, spinal anesthesia is the anesthesia of choice and the (exaggerated) lithotomy position is the position of choice for kees I thru kees IIb fistulas
however, kees III fistulas may need a different approach
reconstructive surgery kees llb stool fistulas
step by step
anorectum/sphincter ani/perineal body reconstruction

introduction
the main objectives of any (obstetric) fistula repair are:
  aa to close the fistula
  bb to make the patient continent and
  cc to preserve or to provide her with something for sexual intercourse
if these three objectives have been achieved the patient will be rehabilitated completely into her own society; this will take place spontaneously without further measures

the cut thru trauma is in the following order: first the posterior vagina wall = pvw, then perineum/perineal body, external sphincter ani, prerectal fascia and last anorectum with internal sphincter

therefore the reconstruction is exactly in the opposite order: first prerectal fascia with anorectum with internal sphincter, then external sphincter ani, perineum/perineal body and lastly pvw adaptation

step-by-step reconstruction see general principles

i anesthesia, position
000
spinal anesthesia with long-acting agent

001
the patient is placed on the operation table with the legs flexed and slightly abducted in stirrups and her buttocks over the end of the operation table
the exaggerated lithotomy position is used if the operation is performed with surgeon standing as preferred by the author
however, the head up/buttocks down position is indicated if the operation is performed with surgeon sitting

ii systematic examination under anesthesia
002
a careful inspection and systematic examination (under anesthesia!) of the whole obstetric trauma and of the fistula as to size, location and texture of the fistula in relation to the anus and the cervix or vagina vault, as to the condition of the vagina such as stricture, stenosis or even atresia, if there is a vesicovaginal fistula as well, if the fistula is accessible, if there is a stricture, circumferential defect etc
check pubic arch in °; if this is ≤ 80° access to operation field and instrumentation may be complicated
the narrower the pubic arch the more complicated the repair becomes

check vagina length in cm; if this is less than 9 cm there has been substantial vagina tissue loss

check position/mobility of cervix

### Kees classification

based upon this examination the fistula is classified, and the surgeon makes up his definite plan of action how to handle this specific fistula as its own unique entity

### Access to operation field

eventual tissue bridge(s) from previous repair(s) are cut to reveal the real trauma

normally an episiotomy is not required but when the fistula is located very laterally, as eg caused by episiotomy, an ipsilateral episiotomy may be of help

bilateral fixation of the skin next to both external sphincter ani ends onto the inner sides of the legs stretching the anorectum trauma into a straight horizontal line to facilitate incision and dissection

### Incision and dissection

the surgical incision is an important part of any operation which should be chosen carefully in line with the natural tissue forces and executed carefully in order to obtain good access to the real operation field

straight transverse horizontal dissecting incision from one sphincter end to the other at the distal posterior vagina wall/anorectum junction with freshening of the sphincter ani ends; aim for just sufficient dissection in one go to minimize wound surface area and postoperative scarring; avoid the salami technique with cutting everywhere resulting in excessive scarring

normally no further dissection is required;

if necessary sharp dissection of the posterior vagina wall from the distal anterior prerectal fascia/anorectum using scalpel and thorek scissors but only minimally to such an extent that closure becomes possible without tension; extensive dissection is avoided because it is not needed and will only lead to more bleeding and/or scarring
if necessary sharp/blunt freeing of adhesions between the rectum and surrounding tissue and/or sphincter ends and surrounding tissue to achieve a tension-free repair; this may be found when the patient has been operated before.

then the stretching sutures are being removed otherwise they would hinder the tension-free closure of the anorectum, sphincter ani and perineal body by pulling exactly the opposite way; or this is done later when the need arises; these have only been placed as preparation for the real reconstructive surgery which is executed as following;

Vi actual step-by-step reconstruction

  aa anorectum with internal sphincter/prerectal fascia
  bb external sphincter
  cc perineal body
  dd posterior vagina wall/perineum skin

aa anorectum with internal sphincter reconstruction by double inverting interrupted/continuous layer

longitudinal closure of the distal anterior anorectum with internal sphincter and anterior anus by a layer of interrupted inverting polyglycolic acid sutures thru the prerectal fascia and muscularis (= internal sphincter) starting 1 cm proximally from the anorectum defect and up to the very distal end of the anterior anus; special care has to be given to the most distal suture at the anocutanous junction which should start inside the mucosa thru muscularis of one side and then thru muscularis/mucosa on the other side and back; if this suture has been tied inside the anus the internal sphincter has been adapted over its full length and the inner ring of the external sphincter should be adapted (as check if the anterior anorectum defect really has been totally repaired); this layer is for strength of the anorectum (= internal sphincter) repair the first layer is inverted by a second layer of continuous polyglycolic acid for an air-tight closure, and then the smooth-muscle internal sphincter has been repaired over its full length if done properly the inner ring of the external sphincter ani muscle is adapted whilst the outer ring is still dehiscent; check this carefully this part of the reconstruction is the most important since it is the internal sphincter which is predominantly responsible for a continuous closure of the anus due to the non-fatigue tonus of its smooth-muscle circular arrangement

cave: if there is anything that would endanger the repair, e.g. major tissue loss due to pressure necrosis, the operation is ended as a first stage and the reconstruction of the external sphincter postponed as a second stage; if needed since complete stool/flatus continence may have already been obtained.
**bb**  external sphincter ani reconstruction

**superficial, deep and subcutaneous part**

013

the striated-muscle external sphincter endings are identified and without any further dissection the already freshened sphincter ends are united in an end-to-end manner by 3 separate polyglycolic acid sutures (superficial, deep and subcutaneous part) making sure the external sphincter is really picked up by pulling onto the sutures before tying

014

after reconstruction of sphincter ani has been finished the patency is tested by the index finger; if it does not enter freely (too narrow) patency is tested by dilator h6 and if it is needed slow gradual dilation is performed up thru h12; carefully in order not to disrupt or perforate

**CC**  perineal body reconstruction

with median reunion of transversus perinei muscles

resp posterior reunion of bulbocavernosus muscles

015

to restore the anatomy and shape of the vulva/perineum and to support the sphincter mechanism the perineal body is repaired by some 3x polyglycolic acid sutures taking deep bites starting para-anally with resulting adaptation of perineum skin

at the same time there will be (in)direct median reunion of the transversus perinei muscles and (in)direct posterior re-union of the bulbospongiosus muscles via the perineal body

after tying these sutures there should be a normal-shape vulva with perineum adapted; by closing the legs the perineum will be kept in place

cave: if it does not look normal on inspection then something went wrong and the repair is not alright and this has to be corrected

**dd**  perineum skin and posterior vagina wall

only median pvw adaptation 1x

015

the posterior vagina wall is adapted by 1x midline adaptation suture; so the pvw and adapted perineum are left intentionally half open according to the principles of septic surgery since the vagina and the perineum are always contaminated and thus ensuring free drainage of bacteria, wound fluid/debris and small blood clots

nb  at each step the surgeon should ask himself what am i doing exactly, which type of tissues are adapted, is it in line with the natural tissue forces and functional anatomy, and how will it look after 1 hour, 1 day, 1 week, 1 month and how ultimately after it has healed completely after 1 or 2 years
vii check result

020
intravaginal visual inspection and careful intrarectal digital examination

021
if it does not look normal on final inspection then something went wrong and the repair is not alright and this has to be corrected by removing the wrongly placed sutures and then place them the right way since anything not in line with the functional anatomy will disharmonize the physiology for the rest of life

viii posterior vagina wall adaptation, episiotomy etc

015
the posterior vagina wall = pvw is adapted by 1x midline adaptation suture; so the pvw and adapted perineum are left intentionally half open according to the principles of septic surgery since the vagina and the perineum are always contaminated and thus ensuring free drainage of bacteria, wound fluid/debris and small blood clots

022
if episiotomies have been performed these are adapted with final skin closure by intracutaneous suturing

022
insertion of indwelling foley catheter ch18 for some 3-5-7 days

023 optional
the vagina is packed tightly with gauze (soaked in antiseptic or not) to help hemostasis though normally complete hemostasis is secured

024
after careful check upon hemostasis and general condition, the patient is transferred to the postoperative ward

ix tissue quality

during the operation procedure the tissue has to be classified as good, medium or poor; this has to be entered into the operation report

x documentation

since documentation is an important part of any type of surgery, analysis of technique, transparent audit and scientific process

write an operation report immediately after the operation, including all the relevant data and also eventual major complications; with prediction of healing and continence on a 5% scale from 5% to 95%; so, everything is documented

the better the documentation the more valuable an evidence-based evaluation becomes of the technique(s) and the program
intraoperative complications
the normal complications like in all other types of surgery are all encountered from time to time and dealt with accordingly

stool/flatus contamination of operation field is cleared by abundant flushing with clean water; the solution to pollution is dilution; and no antibiotics

remarks
the art is to reconstruct the stool continence mechanism step by step whereby slowly but very visible after each step the normal functional anatomy is being restored and the (anterior) anus comes to lie secured in its anatomic distal position outside the vagina and slightly protruding; everything should look normal

if it does not look normal something went/is wrong and needs to be corrected; and this should be documented in the operation report

tips
for sphincter ani reconstruction and perineal body reconstruction working with 2 needle holders will facilitate the instrumentation and as such the operation; the second needle holder will immediately pick up the tip of the needle when it comes out of the tissue so it cannot slip back; a problem with one needle holder and surgical forceps

sometimes for placing the sphincter ani or perineal body sutures it is easier to come out thru the skin with the needle and then go back again; the most important thing is to adapt the tissues as smoothly as possible

for perineal body reconstruction a bigger needle is used since deep bites are taken

sphincter ani rupture with anterior (skin) tissue bridge
this may be found after previous repair whereby only the perineum has been adapted by sutures since the misleading term of perineal tear is used
the first step is to cut straight thru the skin bridge so that the real trauma becomes visible, assess the individual lesions and continue according to the same principles as have been described

sphincter ani rupture with proximal rectovaginal fistula
this is sometimes found as an expression of pressure necrosis and cut-thru trauma
the first stage is to close the proximal rectovaginal fistula which has good chance of healing since no distal obstruction and if healed
then perform sphincter ani reconstruction as described as second stage

sphincter ani rupture with rectum prolapse
this was found in 62-yr-old patient who had undergone yankan gishiri first reduction of rectum prolapse in exaggerated lithotomy position and then step-by-step reconstruction of anorectum, sphincter ani and perineal body exactly as described
this will keep anorectum in place and as such prevent recurrence of prolapse
combination vesicovaginal fistula/prolapse/sphincter ani rupture

combination of vesicovaginal fistula and sphincter ani rupture
the sphincter ani rupture provides a good accessibility to the vesicovaginal fistula and as such
first repair the vvf and only if this went well and the repair time is not longer than 1 hour
the sphincter ani rupture can be reconstructed (but only in experienced hands); otherwise this is the first stage of treating the obstetric trauma
then if the vvf has healed with continence
sphincter ani trauma reconstruction as second stage

combination of genuine intrinsic urine incontinence and sphincter ani rupture
  duration less than 3 months post partum
sphincter ani reconstruction as described and catheter treatment for genuine intrinsic incontinence by indwelling foley ch18 for 4 weeks
should intrinsic urine incontinence persist after catheter removal and bladder drill then perform longitudinal pubocervical fascia repair with urethralization
  duration more than 3 months post partum
the same procedure or first longitudinal pubocervical fascia repair with urethralization and then in the same session sphincter ani reconstruction as described

combination of total 3° cervix prolapse and sphincter ani rupture
the sphincter ani rupture provides good accessibility to the prolapse surgery and as such
first repair the prolapse and then reconstruct the complex sphincter ani trauma in the same session
if this would turn out to be too complicated or would take too long first repair the prolapse as first stage and then if healed perform the sphincter ani reconstruction as second stage

repeat sphincter ani rupture after successful reconstruction
repeat obstetric sphincter ani rupture
perform another reconstruction of the complex sphincter ani trauma according to the very same principles

persistent postrepair stool/flatus incontinence
  a  semicircular incision at anterior anus
  b  sharp dissection of perineal body/posterior vagina wall from external sphincter ani and prerectal facia and check for any defect; repair the defect
  c  rhaphy of the prerectal fascia (supporting internal sphincter) over 3-4-5 cm
  d  rhaphy/reinforcement of external sphincter ani
  e  rhaphy/reinforcement of perineal body (with adaptation of perineum)
  f  leave adapted perineum open
rationale: by repairing any defect, narrowing the anorectum tube and by strengthening the support the continence mechanism may be reinforced
“asymptomatic” sphincter ani rupture
there are some patients with sphincter ani rupture with or without even rather large anorectum trauma who claim to be completely stool/flatus continent and refuse an operation
the surgeon should respect their wish and instruct them that whenever symptoms may appear he is willing to review and operate

grafting
the author never used a gracilis muscle tendon transfer simply because there was no need for it and the theoretic background and the practical implications are not sound medicosurgical practice and will contribute to more additional surgical trauma
for further scientific information see postscriptum

postoperative instructions and follow-up

postoperative instructions
full mobilization should be started by the latest the morning after operation day, no solid food for 10 days and a stool softener like liquid paraffin for 10 days; also liberal use of analgetics
after each bowel movement the perineum/anus have to be cleaned carefully by water and then completely dried
sitzbaths are contraindicated, unless it should become septic, since this will soften the repaired tissue/sutures and breakdown/infection may be more frequent; normally the less one does about an operation wound the better it heals

follow-up
all follow-up checks are done in the operating theater on the operation table with the patient in the same position as during the operation
ten to 14 days postoperatively she will be asked about defecation and stool/flatus (in)continence with complete inspection/examination of the operation site
if it has healed she will be discharged, instructed to refrain from sex for at least 3-4 months and told to come back 1 month later when the same procedure will be repeated up to 5-6 months postoperatively
during her whole stay as well as at each follow-up she is instructed about personal hygiene and that she has to report when 3 months pregnant, to attend antenatal care and to deliver in a hospital
if it has not healed she will also be discharged and instructed to come back after 3 months for another repair which is done according to the same principles as if it were the first
if it has healed with slight incontinence she is reassured this will improve over 2-3 months since the tissues need time to heal completely due to strengthening and re-arrangement under physiologic stress
if the patient complains of gross flatus/stool incontinence a meticulous examination is done to exclude a minute blow-out fistula or a really loose external sphincter ani, and action taken accordingly

all things are meticulously documented by computerized operation reports including all relevant data, by schematic drawings, by digital pre-, intra- and postoperative photos and by written down postoperative check-ups up till 6 months postoperatively; that is the real strength of the programme since it provides evidence-based results

discussion
the presented technique is a minimum-invasive straightforward approach with the objective to reconstruct only the affected individual structures under the philosophy that in surgery only the necessary has to be done, nothing more but also nothing less

however, this has to be done very well with meticulous attention to detail; the job of a surgeon is to bring tissues together in such a way that they will unite completely and that after healing the normal functional anatomy and physiology will be restored

these principles never change though there may be customization to the individual findings in the individual patient

if dissection is needed this should be restricted to the minimum to avoid bleeding and additional surgical trauma

only if there is excessive scar tissue/fibrosis this should be excised up to the prerectal fascia/muscularis but the edge of the anorectum should not be trimmed since this would mean removing valuable muscular tissue

in repairing the distal anorectum as first phase of the reconstruction it is the muscularis (= internal sphincter) together with the prerectal fascia that is being taken up by the needle/sutures and not the mucosa as being described in other studies; otherwise, the internal sphincter being the most important part of the anal continence mechanism would not be reconstructed

the first interrupted layer is for bringing the tissues together and for security should the continuous suture break; the second continuous layer is for airtight closure and for complete approximation of the internal sphincter

since the anorectum is composed of very delicate tissue, instrumentation and tissue handling is of utmost importance whilst care should be taken minimum tension is applied in tying the sutures bringing the tissues together

if at the end of this stage the inner ring of the external sphincter ani is not adapted it means there remains a defect in the distal part of the internal sphincter which may lead to incomplete anal continence; the anocutaneous junction is used as landmark

for comparison of the importance of the internal sphincter: in colorectal surgery it is a well-known fact that in rectum resection (for cancer or anything else) one needs at least 4 cm of the intact distal anorectum to achieve continence in a straightforward end-to-end anastomosis
the external sphincter is reconstructed as the second phase of the reconstruction by uniting the freshened endings in an end-to-end fashion without separate dissection/mobilization of the sphincter keeping the surgical trauma to the minimum; this will restore the normal anatomy; a total of 3 sutures are used for the 3 different parts, first the superficial part, then by pulling on this suture the deep part and the subcutaneous part as last

in the very beginning the author used the overlapping technique a few times but gave it up since it is nonanatomic and nonphysiologic with additional surgical trauma and will narrow the anus (?)obstruction?)

the perineal body is repaired as the third phase of the reconstruction in order to restore the normal anatomy and cosmetic shape of the vulva/perineum and as support for the anal continence mechanism; starting para-anally to support the external sphincter repair

by reconstructing the perineal body also the bulbospongiousus and transversus perinei muscles (which radiate into the perineal body) will be re-united

the adapted posterior vagina wall and adapted perineum are left half open intentionally, since the (distal) vagina and perineum are always heavily contaminated, in order for drainage and spontaneous evacuation of tissue debris, bacteria and small blood clots, once the (ano)rectum, a high-pressure organ, has healed the vagina, a zero- or low-pressure organ, will always heal

in contrast with techniques described in other studies, the levator ani muscles are left untouched since first they are not traumatized, second it would mean creating a non-physiologic situation in combination with additional surgical trauma and third it could lead to dyspareunia if united too tight anteriorly over the anorectum.

the repair is an example of major reconstructive surgery whereby after identifying the individual lesions, each defect is being repaired systematically step-by-step one after the other in a predictable and logical way

though normally the whole repair can be executed in one stage, in complicated cases it should be performed in stages beginning with reconstruction of the anorectum and internal sphincter as first stage, and if healed and only if necessary, since most patients have no complaints once the internal sphincter has healed, reconstruction of the external sphincter and perineal body as second stage

this has been demonstrated in one obese patient who needed 7 operations, viz 5 operations in a university teaching hospital, then only anorectum closure with internal sphincter repair as first stage and then external sphincter ani reconstruction as second stage; then she was ok

in principle, previous repairs do not influence the outcome unless severely mutilated by incompetent surgeons; and repeat operations are performed exactly to the very same principles

the author never had to rely on a colostomy or on other very fancy and far-fetched procedures like gracilis muscle grafting which are against the functional anatomy to impress himself or others; and most of the time are very mutilating
the initial and final postoperative anatomic/cosmetic and functional results from 1,030 consecutive patient over a 35-yr period 1984-2020 were excellent resp 91% and 97.5%:
see chapter on results

still there remain few patients in whom the reconstruction of the anorectum, external sphincter and perineal body is not possible due to subtotal loss of these and other intravaginal structures reminding us that there are limits to reconstructive surgery how skillful and resourceful and experienced the surgeon may be

though in the industrialized world an end-standing sigmoidostomy would be an alternative, this is not an option in the developing world where the only care is a piece of black plastic tied around the waste and covering the colostomy opening and forcing the bowel continents to follow the natural path; the patient is not helped by it and it makes her even more a social outcast and very unhappy

conclusion
this evidence-based operation technique is highly effective since the normal functional anatomy is reconstructed and with it the resulting physiology restored

it is exactly the opposite of the mechanism of action of rupture; and the structures which were ruptured last are the first to be repaired

it is recommended as standard (surgical) management of the complex sphincter ani rupture trauma in all its forms in the low-, middle- and high-income world

obstetric trauma surgery belongs to the most complicated surgery
the author encountered in his professional surgical career
sphincter ani perineal body complex

sphincter ani rupture
kees IIb

001 sphincter ani rupture

reconstruction

002 reconstruction
bilateral stretching sutures

003 dissecting incision

004 eventual further dissection

005 inverting anorectum closure
first suture

006 first suture tied
kees IIB

007 inverting anorectum closure
  second suture

008 second suture tied

009 inverting anorectum closure
  third suture

010 third suture tied

011 inverting anorectum closure
  last suture

012 last suture tied
  first interrupted layer completed

©kees
kees llb

013 inverting anorectum closure
second continuous layer

015 sphincter ani reconstruction
end to end
by three sutures

017 second suture
deep part

reconstruction

014 second continuous layer tied
internal sphincter reconstructed
inner ring external sphincter adapted
anterior anus repositioned

016 first suture
superficial part

018 last suture
subcutaneous part
kees IIb

019  sphincter reconstruction complete

020  perineal body repair

021  perineal body repair

022  sphincter ani reconstructed

sphincter ani rupture

sphincter ani reconstructed

© kees
sphincter ani rupture
suture anocutaneous junction
longitudinal rectum closure
sphincter reconstruction
kees llb

longitudinal rectum closure
sphincter reconstruction

003

004

005
muat (katsina)  female  23 yr  27.07.08

surgeon:  kees waaldijk
assistant:  jamila habibu

diagnosis:  PIII (2 alive), sphincter ani rupture llb with 2.5 cm longitudinal anorectum trauma, stool_flatus incontinence for 7 mth which started immediately following last labor for 1 day, at home live female, married 10 yr ago pre (menarche 2 mth later), still living with husband, no menstruation, no (h/o) drop foot R (grade 5) and L (grade 5), no VVF, no yankan gishiri; normal AP diameter/pubic arch 95°, AR pos, s/o operation at least 1x

operation:  anorectum closure and sphincter ani_perineal body reconstruction
duration:  25 min  healing 90%  continence 95%
anesthesia:  spinal L4/L5 with 3 ml bupivacaine 0.5%

incision at pvw edge, sharp dissection, mobilization of pararectal_anal tissue, longitudinal anorectum closure with internal sphincter repair over 3 cm up to anocutaneous border by double layer of inverting interrupted/continuous serafit, inner ring of external sphincter ani adapted, end-to-end external sphincter ani reconstruction by 3x serafit, perineal body repair by 2x serafit, perineum well adapted, check on hemostasis

FOLEY Ch 18; free urine flow, EUO/BW 15 cm, good elevation, EUO/B 2.1 cm

04.09.08  stool/flatus ok, full continence  both healed
09.10.08  idem
14.01.09  no stool/flatus incontinence, full continence  both healed

RR
preanesthesia:  130/80 mm Hg
5':  120/80
10':  120/70
postoperation:  120/70
inverting anorectum closure
suture anocutaneous junction

suture anocutaneous junction
first interrupted layer completed
anterior anus repositioned

inverting anorectum closure
second continuous layer

second continuous layer tied
anorectum reconstruction
internal sphincter reconstructed
Inner ring external sphincter adapted

sphincter ani reconstruction
three sutures and to end
superficial, deep and subcutaneous parts

sphincter ani reconstruction
completed

perineal body reconstruction

done of reconstruction
everything normal

© kees
famd (kano city)  |  female  |  23 yr  |  08.10.13
--- | --- | --- | ---
surgeon:  | kees waaldijk
assistant:  | hafsat ibrahim
diagnosis:  | PI, mutilated sphincter ani rupture with 1.5 cm longitudinal anorectum lib trauma, stool flatus incontinence for 26 days that started immediately following labor for 1 day, in hospital jakara live female, married 1.5 yr ago post(menarche 8 yr earlier), still living with husband, no menstruation, no drop foot R (grade 5) and L (grade 5), no vvf, no yankan gishiri, no h/o eclampsia; normal ap diameter/wide pubic arch 95°, ar pos, “operated” 1x immediately pp whereby only perineum closed obesity ++ s end R at 10 hr and L at 2 hr inflammation ++ due to stools
\( a/f \) 0 cm, \( i/v \) cm never leaking urine 146 cm
operation:  | severing with anorectum + sphincter ani + perineal body reconstruction
duration:  | 20 min healing 95% continence 95%
anesthesia:  | spinal L4/L5 with 3 ml bupivacaine 0.5% by staff

severing of perineum bridge, deep dissecting incision at pvw edge with freshening of sphincter ani ends, no further dissection, longitudinal anorectum closure with adaptation _rhaphy of internal sphincter over 2 cm up to anocutaneous junction (with repositioning of anterior anus) by double layer of inverting interrupted/continuous serafit, inner ring of external sphincter adapted, end-to-end sphincter ani reconstruction with 3x serafit, perineal body repair with (in)direct re-union of transversus perinei muscles and (in)direct posterior re-union of bulbocavernosus muscles by 3x serafit starting para-anally, perineum well adapted with anus in anatomic position, check on hemostasis

foley ch 18; free urine flow, euo/bw 13 cm, good elevation, euo/b 2 cm
04.11.13 stool/flatus ok, no incontinence both healed
22.12.13 full stool/flatus continence both healed
25.01.14 idem
16.02.14 full stool/flatus continence both healed
only perineum closure mutilating surgery

tissue bridge

after tissue bridge severing

detail

detail

reconstructed
pt 18  zaria  rvf 19
pt 172 documentation of very extensive tissue loss  vvf 192

rym (kano)  female  18 yr  01/10-04
surgeon:  kees waaldijk
assistant:  kabir lawal
diagnosis:  PI, very extensive _ 6 cm 0 urethrovesicovaginal fistula with circumferential defect/multiple tissue bridges, sphincter ani rupture with extensive 4 cm long rectum trauma llb, leaking urine/passing stools pv x 4 yr which started immediately following obstructed labor for 4 days, in hospital SB female, married 5 yr ago post(menarche 1 mth earlier), not living with husband, normal menstruation, drop foot R (grade 2-3) and L (grade 3-4), yankan gishiri by ungozoma during labor; AP diameter/public arch 90°, AR neg with healed ulcer R buttock and saddle hyp_anesthesia at L; operated 1x (kano), subtotal levator ani loss, bare bones covered by periost”, 2°-3° cervix prolapse, total pwv loss

operation:  ureters, circumferential UVVF-“repair” and rectum closure first stage
duration:  60 min
anesthesia:  spinal L3/L4 with 4 ml bupivacaine 0.5%
bilateral ureter catheterization for 20 cm, stab incision, incision at fistula edge, sharp circumferential dissection, advancement/caudad fixation of anterior bladder onto symphysis/urethra, tension-free circumferential UVVF-“repair” by end-to-end vesicourethrostomy by single layer of inverting seraft, triple fixation of FOLEY Ch 18, transverse skin_avw/cervix adaptation by 2x evertting seralon, skin closure, pack; free urine flow, EUO/BW 6 cm, good anterior elevation, EUO/B 1 cm (extensive loss)
moderate bladder capacity (longitudinal diameter 6-1 5 cm)
poor position of UV-junction fixed against caudad third of symphysis
incision at RVF edge, sharp mobilization, tension-free rectum closure with internal sphincter adaptation by double layer of inverting interrupted/continuous seraft leaving anterior rectum uncovered 0.5 cm anterior gap sphincter ani
05.11.04 incontinence and 3 cm anorectum trauma
10.02.05 operation:  static colposuspension + anorectum rvf 22  vvf 205
17.03.05 stool/flatus ok, urine incontinence _, miction both/all healed, stress

RR
preanesthesia:  130/80 mm Hg
5':  120/70
10':  120/70
postoperation:  120/70
Sphinicter ani rupture

Extensive tissue loss

Extensive tissue loss

VVF repaired
Anorectum reconstruction
Same session as first stage

First stage completed
For sphincter reconstruction
As second stage

Healed first stage
For sphincter reconstruction
As second stage

© Kees
pt 6979   katsina   vvf 8851
pt 894   span too wide; anterior/posterior trauma   rvf 1134

opening paravesical space for better different direct fixation

jmkk (katsina)   female   29 yr   03.03.14

surgeon: kees waaldijk
assistant: kabir lawal
diagnosis: PVI (2 alive), cystocele_3° cervix prolapse without genuine stress incontinence, sphincter ani rupture with 3 cm longitudinal anorectum trauma, something coming out of vagina/stool_flatus incontinence for 1 yr which started immediately following last labor for < 1 day, at home live male, married 16 yr ago pre-menarche 4 mth later, still living with husband, still menstruation, foot drop R (grade 4) and L (grade 5), no vvf, no yankan gishiri, no h/o eclampsia; normal ap diameter/wide pubic arch 95°, median defect pc fascia, ar pos, sae 10 hr R and 2 hr L, never repair euo/c cm never leaking urine normal urethra_euo in anat pos euo/bw 18 cm, poor elevation, euo/b 1.1 cm, a/f 0 cm, i/v 12 cm 158 cm

operation: cervix suspension at L + anorectum/sphincter ani/perineal body repair
duration: 40 min obesity ++ healing both 95% continence both 95%
anesthesia: spinal L4/L5 with 3 ml bupivacaine 0.5% by anesthetic staff
small avw/ruga fold incision L with transverse extension up to cervix, sharp dissection to create wound area/surface, longitudinal opening paravesical space free, fixation of cervix (with adherent pc fascia) onto L superior pubic bone/io Pc ilc/atl by 2x seralon, euo/b 2.2 cm, no urine thru euo on rest/cough/pressure, foley ch 18, check on hemostasis; free clear urine flow, euo/bw 17 cm, good elastic anterior elevation at L, rotational descent at R, euo/b 2.2 cm (re-urethralization) good cervix

increased bladder capacity (longitudinal diameter 17-2.2 = 15 cm) poor fascia plate normal-width 2 cm good–quality urethra_euo in anatomic position
deep dissecting incision at pvw edge with freshening of sphincter ani ends, no further dissection, longitudinal prerectal fascia/anorectum closure with adaptation rhaphy of internal sphincter over 4 cm up to anocutaneous junction (with repositioning of anterior anus) by double layer of inverting interrupted/continuous serafit, inner ring of external sphincter adapted, end-to-end sphincter ani reconstruction by 3x serafit (superficial, deep, subcutaneous), perineal body repair with (in)direct re-union of transversus perinei muscles and (in)direct posterior re-union of bulbocavernous muscles by 3x serafit starting para-anally, perineum well adapted with anus in anatomic position

29.04.14 no prolapse, not leaking at all, no incontinence, normal miction stools ok insp/ cx properly fixed, both/all healed, no stress incontinence

06.07.14 operation: longitudinal fascia/anorectum etc   rvf 1147   vvf 8943
21.07 + 18.08.14 not leaking, full continence both, miction both/all healed, no stress
pt 6979  
pt 894  

katsina  
span too wide; anterior/posterior trauma  

rrf 11/1471134

jmkk (katsina)  

female  
29 yr  
06.07.14

surgeon:  
kees waaldijk

assistant:  
kabir lawal

diagnosis:  
PVI (2 alive), complains only about cystocele following cx fixation  
03.03.14, cx properly fixed, still anterior defect sphincter ani rupture with  
1 cm longitudinal anorectum trauma (pt: total stool/flatus continence), still  
with husband, still menstruation, foot drop R (grade 4-5) and L (grade 5),  
no vvf, no yankan gishiri, no h/o eclampsia; normal ap diameter/wide  
pubic arch 95°, median defect pc fascia, ar pos, sae 11 hr R and 1 hr L  
euo/c 6 cm  
never leaking urine  
normal urethra_euo in anat pos  
euo/bw 14 cm, poor elevation,  
euo/b 1.5 cm, a/f 0 cm, i/v 12 cm 158 cm

operation:  
longitudinal fascia repair + anorectum/sphincter ani/perineal body repair

duration:  
30 min  

obesity ++  
healing both 95% cont inence both 95%

anesthesia:  
spinal L4/L5 with 3 ml bupivacaine 0.5% by anesthetic staff

physiologic incision at 2 cm from euo, sharp dissection, 4x2 cm longitudinal defect up to  
2 cm to euo, longitudinal fascia repair up to 1.5 cm to euo with proximal suture thru cx,  
euo/b 2.5 cm, no urine thru euo on rest/cough/pressure, foley ch 18, free clear urine  
flow, euo/bw 14 cm, good elastic anterior elevation, euo/b 2.5 cm  
cx fixed  
normal bladder capacity (longitudinal diameter 14-2.5 = 11.5)good fascia plate  
good position of uv-junction against middle/caudad third symphysis  
normal-width 2 cm good–quality urethra_euo in anatomic position  
deep dissecting incision at pvw edge with freshening of sphincter ani ends, no further  
dissection, longitudinal anorectum closure by 1x inverting serafit, inner ring of external  
sphincter adapted, end-to-end sphincter ani reconstruction by 3x serafit (superficial,  
deep, subcutaneous), perineal body repair with (in)direct re-union of transversus perinei  
muscles and (in)direct posterior re-union of pubocavernosus muscles by 2x serafit  
starting para-anally, perineum well adapted with anus in anatomic position, check on  
hemostasis  
good-quality prerectal fascia

15.07.14  
balloon in euo  
cath removed

21.07.14  
not leaking, no incontinence, normal miction stools ok  
insp/ both/all healed, good elevation, no stress incontinnece

10.10.14  
not leaking, full stool/flatus/urine continence  
both/all healed, no stress

preanesthesia:  
RR

mm Hg

5':

10':

postoperation:
sphincter ani rupture
total cervix prolapse
wide pubic arch

cervix prolapse reduced

cervix fixed

sphincter ani reconstruction
same session

sphincter ani reconstructed

end of operation
complex sphincter ani rupture
related conditions
reconstructive surgery management

introduction
there are several other topic-related conditions which can be surgically managed like anterolateral, lateral and posterior sphincter ani trauma; as well as non-neurogenic incontinence, tight/scarred/long/no perineum, rectocele and rectum prolapse due to loose sphincter ani muscle

these conditions, if there is a real indication, can be operated according to the same reconstructive principles with customization to the specific individual lesions

however, make sure there are no underlying infectious causes such as perineal abscess (unless completely healed off), colitis ulcerosa or morbus crohn, or other like granuloma venereum or malignancy

preoperative care
preparation, operation indication, timing of operation, instructions, antibiotics, patient consent, anesthesia, position on operating table are exactly the same

pre-reconstructive examination
examination under spinal examination
just before the operation is started and under spinal anesthesia, the pubic arch is measured, the anteroposterior diameter of the pelvis and the vagina length

final assessment and plan of action
a final assessment is made of the trauma and individual lesions and a final plan of action is devised

surgical reconstruction of related conditions
anterolateral and lateral sphincter ani rupture
may be due to exceptional childbirth thru ischiorectal fossa or trauma or infection or iatrogenic
first identification of the different lesions and then anatomically correct reconstruction according to the very same principles

posterior sphincter ani rupture
only if no spontaneous healing first identification of the specific different lesions and then anatomically correct reconstruction according to the very same principles
in traumatic posterior sphincter trauma, the anorectum trauma and sphincter ani are reconstructed immediately to the very same principles

so far, 17 patients encountered out of whom 4 needed repair of the posterior sphincter trauma by

small semicircular incision at posterior anus and without further dissection end-to-end sphincter ani adaptation by 2-3 sutures thru anorectum as well

**sphincter ani rupture due to infection**

like (surgical incision of) perianal abscess/fistula, colitis ulcerosa or **Crohn** disease or a specific infection

the surgical reconstruction in these conditions is contraindicated as long as these processes are active; if operated during an active phase the result will be worse than before and the author has seen the sometimes horrific results several times

even if colitis ulcerosa and/or **Crohn** disease are in an inactive phase in principle the author would not operate

for conservative and/or preparation for surgical treatment sitzbaths with water and a detergent twice daily are advised until the wounds are really clean

if sphincter ani rupture due to specific infection like granuloma venereum first treatment of the infection and then only if healed with clean wound for surgical repair

in sphincter trauma due to (surgical incision of) perianal abscess/fistula or other types of infection the surgical reconstruction consists of 2 or more stages according to the principles of septic surgery and reconstructive surgery:

  **first stage**: wide opening, exploration and excision of poor-quality tissue and debris up to healthy tissue; depending upon the trauma and only if not complicated anorectum closure in same session; and leave everything open and continue with sitzbaths

  **second stage** only if clean: closure of anorectum and leave wound (half) open; and continue sitzbaths until healed with clean wound

  **third stage** only if anorectum healed and wound clean: sphincter ani reconstruction with or without perineal body reinforcement as customized to the specific situation

**immediate postpartum distal posterior vagina wall necrosis without rupture**

sometimes patients present immediately post partum with stool/flatus incontinence in combination with distal or total posterior vagina wall necrosis

the dead inert necrotic tissue (with loss of innervation) interferes with the smooth functioning of the stool continence mechanism and there are 2 possibilities either the necrosis is full thickness or not

however, the depth of the necrosis cannot be determined on clinical examination so wait and start immediate treatment by sitzbaths and supportive measures

if the necrosis is full thickness this will result in rupture/fistula within few days; then continue sitzbaths until wound clean and perform whatever is necessary according to the very same reconstructive surgery principles
if the necrosis is not full thickness there is good chance of spontaneous healing unless additional trauma by big stool bolus or iatrogenic by noncareful instrumental or other procedure; so, no manual or instrumental examination, only visual inspection

open perineum rupture, open episiotomy with stool and/or flatus incontinence
though it probably will heal spontaneously something can be done but only if the wound is clean; if not clean speed it up by sitzbaths
as soon as wound is clean one or two deep adaptation sutures in one go thru skin and underlying tissue are performed as half-open closure according to septic surgery principles; leave the rest open

postrepair blow-out distal rectovaginal fistula
this may happen due to the combination of postrepair sphincter ani spasm and intra-anorectal pressure rise due to gas or stools
it is of importance to determine how far the fistula extends distally towards the anus, whether the perineal body is involved and whether the sphincter is involved
001 therefore a median episiotomy is performed thru the fistula up to the anterior sphincter ani
002 then the posterior vagina wall is dissected from prerectal fascia and all the eventual lesions identified
003 the anorectum is closed air-tight by a double layer of inverting polyglycolic acid sutures thru the prerectal fascia/muscularis
003a in principle fistulas are closed longitudinally to reinforce the internal sphincter; small fistulas may be closed by inverting purse string sutures; however, it is up to the surgeon and common sense should determine the direction of closure
004 the sphincter ani muscle may be repaired if defective or reinforced by 1 or 2 rhaphy sutures
005 the perineal body is adapted/repaired by 2-3 sutures with adaptation of the perineum
006 the adapted perineum is left open
the reconstruction is customized to the individual lesions found

post"repair" or congenital too long perineum interfering with sexual health
sometimes patients present complaining of banya (no road) due to a scarred too long perineum after previous repair with (almost) closure of the vulva then a kind of widening introitus can be performed
001 longitudinal incision from tip of the perineum up to 2-3 cm to the sphincter ani to preserve the perineal body
002 excision of all scar/fibrous tissue and careful inspection for anorectum trauma and whether the perineal body is intact
003 if needed repair or reinforcement of the perineal body
004 transverse u-shape adaptation of posterior vagina wall to perineum and lateral vulva skin
005 intravaginal/vulva pack soaked in acriflavine to prevent re-uniting of the labia to be changed every 5 days up to 20 days postoperatively
there are also patients with congenital too long perineum (without scar/fibrosis tissue) of 5-6 cm and then the same procedure can be done according to the very same principles with this technique there is longitudinal opening of perineum with transverse closure
non-neurogenic loose sphincter ani
for instance in liquid urine/stools incontinence with soiling at night after implantation of ureters into the bowels by one technique or the other
001 semicircular incision at anterior anus
002 sharp dissection of perineal body/posterior vagina wall from external sphincter ani and prerectal fascia
003 rhaphy of the prerectal fascia (supporting internal sphincter) over 3-4-5 cm
004 rhaphy/reinforcement of external sphincter ani
005 rhaphy/reinforcement of perineal body (with adaptation of perineum)
006 leave adapted perineum open
rationale: by narrowing the anorectum tube and by strengthening the support the continence mechanism may be reinforced; several patients reported complete flatus/diarrheic stools/urine continence several months postoperatively
the same can be done in persisting stool/flatus incontinence after successful closure of sphincter ani rupture

rectocele
the rectocele is a prolapse of the anterior anorectum thru a median defect in the prerectal fascia and perineal body (with “loss” of perineum); like in cystocele and cervix prolapse there is frequent combination with wide pubic arch and pelvis
the following is done
001 semicircular incision around anterior anus
002 sharp dissection of posterior vagina wall
003 longitudinal repair/rhaphy of the median prerectal fascia defect over 4-5 cm
004 if indicated reinforcement of external sphincter ani
005 reconstruction of perineal body (with adaptation of perineum)
006 leave longitudinally adapted perineum open

rectum prolapse with loose sphincter ani (+ perineal body dehiscence)
one of the causes of rectum prolapse is a loose sphincter ani muscle (with prerectal fascia defect) so that rectum can prolapse thru anus
the following is done after careful assessment
001 reduction of rectum prolapse in exaggerated lithotomy position
002 semicircular incision around anterior anus
003 longitudinal rhaphy/repair of median prerectal fascia defect over 4-5 cm
004 tight rhaphy of external sphincter ani muscle
005 reconstruction of perineal body
006 leave longitudinally adapted perineum open

vulva too wide due to flattened perineum due to dehiscent perineal body
patients present with ba hanya (no road) but on further asking the real problem is that during sexual intercourse there is no grip
then a kind of narrowing introitus plasty can be performed
001 transverse slightly curved incision at posterior vaginocutaneous junction
002 sharp dissection of posterior vagina wall from prerectal fascia over 2-3 cm
003 reconstruction of perineal body (with adaptation of perineum)
004 leave longitudinally adapted perineum open
it is the opposite of the widening introitus plasty; here with transverse opening and longitudinal closure of perineum
congenital anterior ectopic anorectum opening

though this is not an obstetric condition the obstetric trauma surgeon is confronted with it and is asked to help
though the author performs this type of surgery with good results since he has been trained in colorectal surgery he would like to refer to the textbooks
still there are some criteria
001 infant must be a minimum of 7-8 years old
002 check if the closed anus can be identified
003 check if the external sphincter ani muscle can be identified
004 ask oneself if one is able to handle it; if not it is better to refer
005 act accordingly to the findings
006 ketamine anesthesia is recommended
there is no need here to speed things up since it is not an emergency and the major problem is that everything is small and anesthesia may be complicated

postpartum stool/flatus incontinence without sphincter ani rupture
see next chapter

remarks

the art is to reconstruct the stool continence mechanism step by step as customized to the specific situation whereby slowly but very visible; after each step the normal functional anatomy is being restored; at the end everything should look normal if it does not look normal something has been done the wrong way during surgery and should be corrected

postoperative instructions and follow-up
exactly the same as already described

discussion
first of all it is of utmost importance to identify the individual traumatized structures in order to understand what has happened and to make a final plan of action
and then customize the approach and proceed according to the very same principles of reconstructive and septic surgery
though the variety may be large and the actual condition may look hopeless, once the surgeon sticks strictly to these principles and his approach is systematic almost all conditions can be solved to the benefit of the patient .... and the surgeon
stick to the principles of only reconstruction of the functional anatomy; never think one knows it better than nature
anything not in line with the functional anatomy will compromise the result life long
lateral sphincter ani defect following incision for perianal abscess

excision scar tissue

anorectum adaptation leaving rest open

wound healed still lateral sphincter defect

lateral sphincter defect

reconstructed

© kees
delivery of infant thru ischiorectal fossa at left
detail
assessment
birth canal
anorectum + sphincter reconstructed
skin adaptation 1x operation end
traumatic sphincter trauma
impalement
after sitzbaths
detail
stretching sutures
reconstruction
reconstruction completed
everything normal
rectocele
wide pubic arch

repaired

anal urine incontinence
after
ureterosigmoidostomy

sphincter ani/perineal body
rhapsy

postrepair mutilation
sphincter ani rupture + urine incontinence

both repaired
ectopic anus
no sphincter tissue detected

ectopic anus

repaired

repaired

ectopic anus
sphincter tissue present

ectopic anus

©kees
surgical treatment and outcome
kees IIb stool fistulas
complex sphincter ani rupture
in
1030 patients

baseline data
obstetric vs nonobstetric
durationistula size
etc

surgical outcome
1,187 operations in 1,030 patients
results at first attempt
final results
baseline data kees IIb stool fistulas
1,030 patients as operated so far
including 293 from metropolis with over 1-5 million inhabitants
as a failed system of obstetric care

obstetric versus other cause
obstetrics is by far the main cause of the fistula in 95% of the patients as operated for kees IIb stool fistula; as indication of a failed system of obstetric care

whilst the remaining 5% were due to other causes like penetrating trauma including sex, congenital, yankan gishiri though few were performed during delivery and counted as obstetric as well, necrotizing infection etc

combination with vesicovaginal fistula
over 50% are combined with a vesicovaginal fistula in prolonged obstructed labor whilst the remaining were isolated in precipitous labor

combination with cervix prolapse
in 45 or roughly 4.5% the sphincter ani rupture was combined with cervix prolapse of at least c2-3 out of introitus

colostomy
at previous repair in 11 patients

also classifiable as kees IIa
the 16 patients with congenital ectopic anus could be classified as kees IIa fistulas as well

fistula size
45% of the fistulas were small, 40% medium, 9% large and 6% extensive however, the size alone is not representative since there are extensive small fistulas and “small” extensive fistulas in terms of real obstetric trauma

age at fistula
the great majority of 68% were younger than 20 yr when they developed the fistula; however, the age is not a contributing factor as a blunt lie by hypocritic people behind a desk look at the teenage deliveries in the united states and the united kingdom
index parity in the 978 obstetric fistulas
the index parity ranged from para 1 thru para 14 with majority of 570 patients or 60% at para 1
indicating that the first delivery is a test case for the pelvis and introitus

place of delivery in the 978 obstetric fistulas
the great majority of 657 patients or 67% delivered in a hospital indicating a failed system of obstetric care

mode of delivery
the great majority of 885 patients or 90% delivered vaginally spontaneously or by assisted labor whilst the rest or 10% of the patients delivered instrumentally, mostly by cesarean section

cesarean section in the 978 obstetric fistulas
cesarean section for the index delivery was performed in 63 patients or 6.5% out of whom 15 were para I, so only one delivery
the explanation for developing a sphincter rupture if one has delivered by cs may be that a vacuum or forceps had been tried unsuccessfully as followed by cs or some other weird procedure

sex infant at index delivery
the 7:3 male to female sex rate in these kees Ilb stool fistulas and the 2:1 rate in vesicovaginal fistulas cannot be explained by the heavier male birthweight; so, another mechanism must be in play eluding the author who was the first to find and point this out; already in his phd study in 1989

health status infant
if the sphincter ani rupture was combined with a vesicovaginal fistula over 90% of the infants were stillborn due to prolonged obstructed labor

whilst
if there was an isolated sphincter ani rupture over 90% of the infants were alive since precipitous labor

duration of fistula on operation day
roughly 40% with a fistula duration from 1 yr to over 40 yr indicating non-availability of expertise
whilst roughly 30% were operated within 3 months post partum
previous repair
roughly 68% or two thirds of the patients had been operated already from 1 to 12 times, and probably more since most patients do not notice immediate surgery after childbirth; as a clear indication that reconstructive surgery of the complex sphincter ani rupture is highly complicated and not just a couple of sutures

mutilation
previous repairs resulted in mutilation in 211 patients or roughly 20%

necrotizing infection
a necrotizing infection with loss of labia was found in 15 patients, 14 post partum and 1 post measles
in the postpartum patients it is not clear if the necrotizing infection contributed to the sphincter ani rupture or the sphincter rupture contributed to the necrotizing infection

vagina
shortening in 108, stenosis in 90 and strictures in 22 patients indicating what the obstetric trauma means for the pelvis organs with consequences for reconstruction of the functional female pelvis anatomy

foot drop
peroneal nerve trauma in 978 obstetric fistulas was found in 78% of which 327 bilateral plus 383 right foot only and 55 left foot only; so, the right leg more affected than the left leg
the obstetric trauma is more than only the obstetric fistula

repeat obstetric sphincter ani rupture subsequent deliveries
this was found up to 4 times in 27 patients or 3%

see also table
### Table Kees IIb Stool Fistula Data

#### Obstetric Versus Other Cause

<table>
<thead>
<tr>
<th>Cause</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric</td>
<td>978</td>
<td>95.0%</td>
</tr>
<tr>
<td>Penetrating trauma</td>
<td>22</td>
<td>2.1%</td>
</tr>
<tr>
<td>Rough sex, rape</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Congenital</td>
<td>16</td>
<td>1.6%</td>
</tr>
<tr>
<td>Yankan gishiri</td>
<td>13</td>
<td>1.3%</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>3</td>
<td>0.3%</td>
</tr>
<tr>
<td>Infection</td>
<td>3</td>
<td>0.3%</td>
</tr>
<tr>
<td>Postmeasles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Combination with Vesicovaginal Fistula

<table>
<thead>
<tr>
<th>Combination</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined with VVF</td>
<td>548</td>
<td>53.2%</td>
</tr>
</tbody>
</table>

#### Combination with Cervix Prolapse

<table>
<thead>
<tr>
<th>Prolapse</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervix prolapse beyond introitus</td>
<td>45</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

#### Also Classifiable as Kees IIa

<table>
<thead>
<tr>
<th>Anus</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ectopic</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Fistula Size

<table>
<thead>
<tr>
<th>Size</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small ≤ 2 cm</td>
<td>469</td>
<td>45.5%</td>
</tr>
<tr>
<td>Medium 2-3 cm</td>
<td>410</td>
<td>39.8%</td>
</tr>
<tr>
<td>Large 4-5 cm</td>
<td>90</td>
<td>8.7%</td>
</tr>
<tr>
<td>Extensive ≥ 6 cm</td>
<td>61</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

#### Age at Fistula

<table>
<thead>
<tr>
<th>Age</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 yr</td>
<td>26</td>
<td>2.5%</td>
</tr>
<tr>
<td>10-15 yr</td>
<td>356</td>
<td>34.6%</td>
</tr>
<tr>
<td>16-19 yr</td>
<td>283</td>
<td>27.5%</td>
</tr>
<tr>
<td>20-29 yr</td>
<td>255</td>
<td>24.8%</td>
</tr>
<tr>
<td>30-39 yr</td>
<td>98</td>
<td>9.5%</td>
</tr>
<tr>
<td>40-49 yr</td>
<td>12</td>
<td>1.2%</td>
</tr>
</tbody>
</table>
index parity
the index parity ranged from **para 1** thru **para 14** with **majority of 60%** at **para 1**

| **para 1** | 570 | 58.3% |

indicating that the **first** delivery is a test case for the pelvis and introitus

place of delivery

| **hospital** | 657 | 67.2% |
| **home** | 303 | 31.1% |
| **not asked** | 18 | 1.7% |

mode of delivery

| **spontaneous/assisted vaginal** | 885 | 90.5% |
| **instrumental, cs etc** | 93 | 9.5% |

index delivery by cesarean section

| **however, with sphincter ani rupture** | 63 | 6.4% |
| **para 1** | 15 |

sex infant at index delivery twin 6x

| **male** | 671 | 68.2% |
| **female** | 313 | 31.8% |

health status infant

| **sb** | 514 | 52.2% |
| **live** | 470 | 47.8% |

indicating the obstetric trauma to the infant

operated before

| **at least once up to 12x** | 697 | 67.7% |
| **mutilated** | 211 | 20.5% |
| **inoperable** | 13 | 1.3% |
| **colostomy** | 11 | 1.1% |

indicating the complexity of the surgery

duration of fistula on operation day

| **< 3 mth** | 329 |
| **3 mth to < 1 yr** | 300 |
| **1 yr to over 40 yr** | 401 | 38.9% |

indicating the non-availability of expertise
vagina
   shortening < 9 cm  108
   vagina stenosis  90
   vagina stricture 22
indicating the obstetric and/or additional trauma

foot drop     peroneal nerve trauma in 978 obstetric fistulas
   total         765       78.2%
   bilateral     327
   right foot only 383
   left foot only  55
showing right leg more affected than left leg

living in metropolis
   living in big cities 293       28.4%

repeat obstetric sphincter ani rupture
   from 2 up to 4 times 27       2.8%
      2nd            23
      3rd             3
      4th             1

the complex sphincter ani rupture is not a perineum tear
postoperative results in kees IIb fistulas
1,173 repairs in 1,030 patients

reconstructive surgery in 1,030 patients
presurgical/surgical data and outcome of surgery are presented in table I and II

table I
presurgical data at first attempt by the author in 1,030 patients
697 patients had been operated from 1 to 12 times
with mutilation in 211
11 patients had a colostomy as well and
nb already 13 patients were inoperable from the author’s start
though 3 healed after last resort attempt

table III
results kees IIb reconstructive surgery 1,030 patients

<table>
<thead>
<tr>
<th>Healed First Attempt</th>
<th>936</th>
<th>90.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inoperable</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Healed Finally</th>
<th>1,003</th>
<th>97.4%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Not Healed</th>
<th>27</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inoperable</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incontinence</th>
<th>10</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ureterosigmoidostomy</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

discussion surgery/results
fistula surgery belongs to the most complicated reconstructive surgery the author ever encountered during his extensive surgical career

these principles are evidence-based guidelines which have to be customized to each and any fistula as its own specific unique entity

the most important is to reconstruct the functional pelvis anatomy in a straightforward way with in the process closure of the fistula which is more complicated in the kees IIb stool fistulas than anticipated

so one has to concentrate on the basics which is already highly complicated considering the failure rate even in experienced hands in kees IIb stool fistulas
as demonstrated by the fact that the failure rate at first attempt by the author was 9% in this series whilst 13 fistulas were inoperable right from the beginning.

It is good to realize that there is always traction upon the repair from multiple structures: circular from external sphincter ani muscle, sideward from transversus perinei muscles, anterior from bulbocavernosus muscles and towards sacrum from loose anorectum.

If the repair broke down, the residual fistula was operated according to the same surgical principles as the first repair, resulting in a final closure rate of 97.5% in all fistulas and of 98.5% in the operable fistulas.

The low rate of postrepair incontinence may be due to the meticulous attention paid on reconstruction of the anorectum with internal sphincter up to the anocutaneous junction.

Unfortunately, one patient died on day 21 after repair from high fever/dehydration and one patient died on day 14 in the middle of a meningitis epidemic.

Obstetric fistula surgery will bring any surgeon down to the earth with both feet planted solidly onto the ground since anybody can see and also the blind can smell the misfortunes.
conservative treatment and outcome
kees Ilb stool fistulas
complex sphincter ani rupture
in
233 patients

spontaneous healing

no complaints/full continence

results
conservative treatment results in kees IIb fistulas  
in 233 patients  
no complaint/full continence and spontaneous healing

introduction
spontaneous healing of small sphincter ani traumata is possible within 4-6 weeks post partum; with complete healing or “healing” with small “gap filled by scar tissue” and still resulting in full stool/flatus continence

some patients claim full stool/flatus continence even with complete sphincter ani rupture and large anorectum trauma even of long-standing duration of 20 years or longer and refuse an operation

though few come back later for a repair even if still with full continence; probably for cosmetic or other reasons

during catheter treatment, vvf-repair or proximal rvf-repair also a sphincter ani rupture was identified and at first treated conservatively for whatever reason in 233 patients

patient data
out of the 233 patients 91 came within the first 2.5 months after delivery and 21 within 3-4 months

all the patients came for involuntary urine loss and were treated by catheter and/or vvf surgery

preliminary results
spontaneous healing 97
full stool/flatus continence
no complaints with fistula 91
however, returning later for repair 10 all healed
not healed 45
however, operated later 11 all healed
whilst inoperable 4

final results
healed and/or no complaints 199
not healed/no return after vvf-repair 34
inoperable 4
comments
spontaneous healing of early small kees IIb fistulas/external sphincter ani rupture is possible either by complete direct healing or by indirect “healing” via scar tissue filling up the small gap and so restoring the circular configuration of the external sphincter ani muscle

full stool/flatus continence with real complex sphincter ani may be explained by strong action of the puborectalis muscle with closure at the anorectal angle

this may not be sufficient for diarrheic stools since even with an intact stool continence mechanism most people are not fully continent in this situation
postpartum stool/flatus incontinence
without sphincter ani rupture/kees IIb fistula
in
some 700 patients

posterior vagina wall necrosis
   full thickness
   nonfull thickness

obstetric neurogenic incontinence
   somatic nervous system
   autonomous nervous system
   combination somatic/autonomous

nonobstetric neurogenic incontinence
   out of scope of this book
postpartum obstetric stool/flatus incontinence without sphincter ani rupture

as based on some 700 patients

introduction

many patients complain of stool/flatus incontinence immediately after childbirth and the first thing is to establish whether it needs surgical intervention or not and whether it will heal spontaneously or not
here only the nonsurgical conditions will be mentioned

obstetric incontinence due to posterior vagina wall necrosis

distal or total posterior vagina wall necrosis; or already in healing phase

patients present with stool/flatus incontinence immediately post partum and distal posterior vagina necrosis without a fistula

the mechanism is that the inert nonfunctioning dead necrotic tissue with innervation loss is interfering with the smooth functioning of the stool continence mechanism; there are two possibilities either full thickness or not full thickness necrosis; this cannot be established immediately after childbirth only retrospectively

necrosis is full thickness

the necrosis is full thickness and the patient will develop rupture/fistula within a couple of days and then it becomes a surgical condition; see previous chapter

necrosis is not full thickness; or already in the healing phase

the necrosis is not full thickness which makes spontaneous healing likely, unless additional trauma by big stool bolus or iatrogenic by noncareful instrumental or other procedure; or if seen later it is already in the healing phase
so, the first rule is do not interfere with the physiologic healing process; besides visual inspection no manual or instrumental examination; just wait and speed up the healing by immediate sitzbaths and supportive measures
however, until complete healing and regeneration has taken place this will interfere with the stool continence mechanism; also fibers of the autonomic nervous system have to find their way and grow into the regenerated tissue
the whole healing process may take 2-3 months though normally it goes rather quick

episiotomy and 1° or 2° perineum tear weak support

without external sphincter ani trauma

quite a number of patients present shortly after childbirth with stool and/or flatus incontinence due to an (infected) perineum tear 1° or 2° or a broken down episiotomy
though this will heal spontaneously with full continence, sitzbaths are indicated and if clean a few adaptation sutures can be applied
obstetric neurogenic stool/flatus incontinence  
no visible trauma to anus, perineum, posterior vagina wall

considering the different innervation of the internal sphincter and external sphincter there are a number of possibilities though for both local trauma and plexus trauma either isolated or combined or all combined are possible

the sympathetic and parasympathetic nervous system is innervating the internal smooth muscle sphincter which is also influenced by the enteric nervous system; for its function no clinical test is available

the pudendal nerve is innervating the external striated sphincter ani muscle; to test its function the anal reflex is used

the intensity of the trauma may be slight, moderate or extensive resulting in slight, moderate or even total loss of function

the good thing is that normally there is spontaneous healing with full recovery; first the patient becomes continent for stool and later on also for flatus

for scientific reasons the following possibilities may be the cause; either isolated or in any kind of combination

internal sphincter paresis
local trauma to autonomic nervous system at internal sphincter level
trauma to nerve during its course
pelvic plexus trauma
enteric nervous system trauma

external sphincter paresis
local trauma to pudendal nerve at sphincter level
trauma to pudendal nerve during its course
sacral plexus trauma

combination of internal sphincter/external sphincter paresis
in whatever combination

nonobstetric neurogenic incontinence
actually this topic does not belong in this manuscript but a short outline will be given to complete the overall view; there are many possibilities and careful history taking and examination is necessary since patients are not coming out by themselves
these conditions are not being documented or managed by the author

spina bifida: overt or occult
if this is the cause normally the patient is already stool/flatus incontinent since she was borne; but not all affected persons are incontinent
one patient with visible sacral meningocele claimed to be totally stool/flatus continent until she delivered
so inspect the backside and look for scars of previous operation as well

senile incontinence
unfortunately this happens rather frequently
though in the low-income world there is no treatment for this type of incontinence these patients may still benefit from strict personal hygiene and
strict proper stool training
set a time for active defecation (if the need is felt or not) in the morning after breakfast (gastroanal reflex) and continue this practice every day so that and the mind (brain) and the body is programmed and after some time and continuing this training defecation will be regulated more or less
one father who consulted me for/with his 8-yr-old son with spina bifida and stool/flatus incontinence reported 3-4 mth later to me personally that the problem had been solved

discussion
the variety of postpartum stool/flatus incontinence is large and the first thing which has to be established is whether this constitutes a surgical or a nonsurgical condition
if incontinence is due to posterior vagina wall necrosis wait for breakdown or complete spontaneous healing; no manual or instrumental examination
though a perineum tear and a broken down episiotomy with intact external sphincter ani are not stool fistulas they may cause postpartum stool and/or flatus incontinence due to loss of support to the continence mechanism
once healed with restoration of support first stool continence and later flatus continence will be ensured
the more specific the history taking the more frequent one finds obstetric neurogenic stool/flatus incontinence; the real incidence is not known though it must be high
normally this condition heals spontaneously and completely within 2-3 months and even far quicker; first the patient becomes continent for stool and later on also for flatus
if it does not heal spontaneously a careful examination is performed to find out what is wrong and then action taken accordingly; ?rhaphy of whole continence mechanism? as last resort
in patients with nonobstetric neurogenic stool/flatus incontinence strict personal hygiene with stool training may be of benefit
vulva gangrene
open anus

visible stool incontinence

sphincter ani reflex testing

negative anal reflex at right

negative anal reflex at left

saddle anesthesia

© kees
summary and discussion
kees IIb stool fistulas
complex sphincter ani rupture

II fistulas involving continence mechanism
b with external sphincter ani involvement

introduction

mechanism of action

characteristics

reconstructive surgery

results

discussion

conclusion
summary and general discussion
kees IIb stool fistulas
complex sphincter ani rupture

introduction

the fistula which II does involve the anatomic stool continence mechanism and b with sphincter ani involvement is a kees IIb fistula

the kees IIb stool fistulas are a rather common finding and constitute some 25% of all the rectovaginal fistulas in the author's experience

roughly 95% are due to obstetric trauma whilst the remainder 5% may be caused by something else

over 50% of the obstetric kees IIb stool fistulas are combined with a vesicovaginal fistula whilst the majority of the nonobstetric fistulas are isolated

also within this kees IIb class the variety is enormous; whilst there is a fluid transition from perineum tear and kees IIa into kees IIb stool fistulas

however, the complex sphincter ani rupture is definitely not a perineum tear though it is combined with a perineum tear; the same like a compound fracture is combined with a skin tear

spontaneous healing during the first 1 to 2 months immediately after delivery is possible but most patients need reconstructive surgery

whilst some patients claim full stool/flatus continence

mechanism of action

cut-thru trauma of the fetal head thru the distal posterior vagina wall, perineal body, external sphincter ani, prerectal fascia and anterior anorectum wall = internal sphincter; so, no anatomic tissue loss

or

seldomly pressure necrosis of the soft tissues in between the fetal skull and the maternal sacrum and/or coccyx bone; so, real anatomic tissue loss from minimal to extensive

or

trauma like rough sex, episiotomy, yankan gishiri, other surgery, caustics

or

autoimmune like infectious bowel disease, eg crohn

or

infectious like postmeasles noma vaginae, lymphogranuloma venereum, abscess or postpartum necrotizing infection

or

congenital like ectopic anus
cut-thru mechanism

thru the following structures in the following order
- posterior vagina wall = pvw
- perineum with disruption of median resp posterior union of transversus perinei resp bulbocavernosus muscles
- external sphincter ani
- prerectal fascia
- internal sphincter ani = anorectum

principles reconstruction

in exactly in the opposite order
- anorectum with internal sphincter/prerectal fascia
- external sphincter ani
- perineal body with median resp posterior reunion of transversus perinei resp bulbocavernosus muscles
- pvw adaptation

characteristics over 50% combined with vesicovaginal fistula

originally since it is a cut-thru trauma, there is no tissue loss but substantial iatrogenic tissue loss due to previous surgery may be encountered; more than 90% of the author’s patients had been operated at least once up to five or even more times

history taking, assessment and identification of individual defects are important in order to make a provisional plan of action

besides all the routine preoperative measures, the cleaning of the wound by sitzbath in water plus a detergent is the most important

typical (prophylactic) antibiotics are not indicated pre-, intra- or postoperatively and are actually harmful as they contribute to the world-wide problem of multi-resistance; only on real indication for treatment like puerperal sepsis, pneumonia etc; even if the repair should breakdown or in case of wound infection its use is considered to be surgical malpractice, instead of wide opening, drainage and cleaning

as soon as the wound is clean and her general condition ok the patients is considered to be a candidate for reconstructive surgery

reconstructive surgery

under spinal anesthesia just before the surgery is started a careful examination is performed with assessment and exact identification of all the specific lesions and based upon this examination a final plan of action is made

slowly but very visible the functional anatomy of the female stool continence mechanism is reconstructed step-by-step with meticulous attention to detail and customized to the individual needs of the patient; exactly the opposite of the trauma mechanism of action and the last structure traumatized is the first to be reconstructed
working with two needle holders and different needle sizes are recommended in order to facilitate the instrumentation and as such the operation

normally the whole reconstruction is performed in one session but if the trauma is very extensive or too complicated or anything else which would compromise the result the anorectum is reconstructed as first stage and if healed and if needed the sphincter ani and perineal body are reconstructed as second stage

combination of sphincter ani rupture with vesicovaginal fistula, genuine urine intrinsic stress incontinence, cervix prolapse or rectum prolapse are described including their surgical management according to the same principles; this also applies for sphincter breakdown or repeat obstetric sphincter ani rupture after successful reconstruction

though the main cause is poor obstetric care other traumatic causes are described like sexual intercourse, rape, iatrogenic including yankan gishiri, impalement, road traffic accident, cow horn or other penetrating trauma

these patients are managed to the very same reconstructive surgery principles as described with customization to the specific individual lesions/needs

philosophy
reconstruction of the normal functional anatomy will ensure the normal physiology after healing and under physiologic stress

the real master shows himself in his restrictions; so, do only what is necessary; whilst “lazy” surgeons are the best

cave “asymptomatic” sphincter ani rupture
there are several patients with an obstetric sphincter ani rupture with even rather large anorectum rupture who claim to be completely stool/flatus continent and refuse surgery and their wish should be respected

unrepairable rupture
still there remain few patients where the trauma is so extensive that a reconstruction is no longer possible however resourceful the skills and experience of the surgeon; due to tissue loss (pressure necrosis or previous surgery)

sphincter ani rupture related conditions
normally the location of trauma is anterior but other locations like (antero)lateral and posterior are possible; and their management is described

then the cause may be infectious such as nonspecific infection like perianal abscess (especially after surgery), specific infection like granuloma venereum or autoimmune “infection” like colitis ulcerosa and crohn disease
only if the infection has been completely cured a reconstruction can be performed according to the very same principles; however, in principle the autoimmune “infections” are a contraindication even in a quiet state

immediate postpartum distal posterior vagina wall necrosis without rupture but with stool/flatus incontinence is treated conservatively by sitzbaths; only inspection and no instrumental or manual examination; if it should breakdown the whole management is set into motion

open perineum rupture/open episiotomy with stool/flatus incontinence is treated conservatively by sitzbaths until healed; eventually one or two deep adaptation sutures can be applied

in postrepair blow-out distal rectovaginal fistulas the extent of the blow-out is carefully assessed and action taken accordingly

post “repair” or congenital too long perineum interfering with sexual health can be treated by a kind of widening introitus plasty with longitudinal incision and transverse closure

in non-neurogenic loose sphincter ani a rhaphy of the sphincter ani muscle and the perineal body is performed in order to reinforce the functional anatomy of the continence mechanism

rectocele is a prolapse of the anterior anorectum thru a median defect in the prerectal fascia and perineal body and the responsible defects are repaired

vulva too wide due to flattened perineum due to perineal body dehiscence resulting in poor or no grip during sexual intercourse is managed by a kind of narrowing introitus plasty with transverse incision and longitudinal closure

postoperative care

the normal routine postoperative management; however, no sitzbaths as these may interfere with wound healing, unless breakdown; and no antibiotics

stool softeners like liquid paraffin and no solid food for 10 days whilst after each bowel movement the anus/perineum should be cleaned with water and then dried completely

obstetric neurogenic stool/flatus incontinence without rupture

quite a number of patients present with immediate postpartum stool/flatus incontinence without a sphincter ani rupture due either to local or to plexus trauma to autonomic nervous system and/or to pudendal nerve

only the pudendal nerve function can be tested by the anal reflex but then both sides; if the anal reflex is negative also (half)saddle anesthesia may be found

normally this condition heals off within 2-3 months and the patient is reassured
results

in a large series of 1,030 consecutive patients (out of whom over 70% had been operated already at least once up to twelve times) 91% had healed at first attempt whilst after final attempt 98% had healed with full stool/flatus continence following these principles; whilst the incontinence rate of the healed fistulas was only 1%

discussion

the operation technique described is a physiologic procedure whereby the external sphincter ani endings are only freshened without further dissection and then united in an end-to-end manner

the overlapping sphincter reconstruction is a nonphysiologic procedure whereby the external sphincter is mobilized and also dissected from the internal sphincter otherwise the anal mucosa will interfere negatively with the healing

the failure at healing may be due to the continuing traction upon the repair from multiple structures: circular from the external sphincter ani muscle, sideward-bilateral from the transversus perinei muscles, anterior from the bulbocavernosus muscles and towards the sacrum by the anorectum/internal sphincter

the low postrepair incontinence rate of 1% may be due to the fact that meticulous attention has been paid to reconstruct the anorectum with internal sphincter up to the anocutaneous junction whilst sticking to reconstruct the functional anatomy with minimum dissection and only doing what is needed; which in itself is already highly complicated

reinforcement by gracilis muscle tendon transfer is not recommended on theoretic and practical grounds

conclusion

as based on the functional anatomy of the female stool continence mechanism and the mechanism of action in obstetric sphincter ani rupture complex trauma the principles of a step-by-step reconstruction have been outlined whereby slowly but very visible the normal anatomy and resulting physiology are restored with excellent results

the end-to-end sphincter ani reconstruction is totally in line with the functional anatomy and as such superior to all other techniques which do not respect these principles

nb these overall excellent results are due to the fact that the author first studied the functional pelvis anatomy in detail, then the anatomic and physiologic stool/continence mechanism, then analyzed the mechanism of action, then developed real reconstructive surgery principles and at last perfected and is still perfecting the operation technique as based on evidence keeping the additional surgical trauma to a minimum and sticking consequently to reconstruct the functional pelvis anatomy ensuring physiology
basic science

see textbook functional female pelvis anatomy

what is needed

anatomic stool continence mechanism

pelvis anatomy essentials

management principles
  rectovaginal/stool fistulas
what is needed before a start is made

one has to master the complicated functional anatomy of the pelvis, the pelvis organs and the pelvis floor

one has to understand the functional anatomy as interaction between the different structures in order

to understand the physiology of the urine and stool continence mechanisms in the female

one must be able to identify the individual structures of the functional anatomy in the living female

which is different from the post-mortem dead anatomy

one has to study and understand the mechanism of action of the obstetric trauma, what it does to the functional anatomy of the individual structures and master the enormous variety of lesions

one must be able to identify and assess the individual obstetric trauma defects in the living female

one must study, understand and master the mechanisms of action of urine and stool incontinence and of prolapse in the female

then one must devise a plan of action how to reconstruct the functional anatomy as customized to the individual findings and needs

one must master not only the principles of general, gynecologic, urologic, colorectal and reconstructive surgery but since the vagina is never sterile also the principles of septic surgery

one must understand and respect the natural tissue forces inside the human body

one must master the physiologic healing processes in order to promote the enormous natural healing potential of the human body realizing it starts the moment an incision is made

preferably one undergoes a practical training with a step-by-step approach where the basic skills are demonstrated in order to learn these skills

though the skills can be demonstrated and be practiced step by step under strict supervision there is NO automatic transfer of these skills and the ultimate responsibility and accountability for any surgery rests upon the performing surgeon

the decisive factor in surgery is the surgeon
female stool continence mechanism
functional anatomy

introduction

the functional anatomy of the female stool continence mechanism consists of a rather complicated multi-interaction of static (connective tissue) and dynamic structures (muscles; mucosa, submucous vascular plexus) and nervous innervation

the anatomic stool continence mechanism is situated within the distal 4-5 cm of the anorectum, the external sphincter ani muscle and support

there is an internal smooth muscle sphincter and an external striated muscle sphincter with washer effect by the mucosa and submucous vascular plexus

the distal anorectum and external sphincter ani are anchored into the pierced thru punched out opening in the perineum outlet diaphragm of the pelvis floor

here only a short comprehensive outline is given as a start/incentive to more extensive self-study

functional anatomy

anatomic stool continence mechanism

anorectum-rectum junction
diameter
anorectal angle, normally 80°-100° as influenced by the puborectalis muscle

anorectum
length 4-5 cm
shape and diameter
lumen
anus mucosa
anal cushions = columnae anales
submucous vascular plexus
circular smooth muscle fibers = internal sphincter ani
longitudinal smooth muscle fibers

sphincter ani muscle
circular striated muscle fibers around distal anorectum/anus
consisting of mostly slow-twitch for tonus but also fast-twitch for emergency closure divided into three parts:
  subcutaneous
  superficial
  deep
anatomic/physiologic support

**rectovaginal or prerectal fascia** (of denonvillier)
supports the anterior anorectum

**perineum outlet diaphragm**
the anorectum with external sphincter ani complex are firmly anchored into the pierced thru punched out opening within the perineum outlet diaphragm

**perineal body (= centrum tendineum perinei) with transversus perinei and bulbo spongiosus muscles**
stabilizes the anus and sphincter ani anteriorly and laterally; in a way that is comparable to the role of the endopelvic diaphragm in stabilizing the posterior urethra

**anococcygeal ligament**
stabilizes the anus posteriorly

**levator ani muscles + levator plate**
anterobilaterally from pubis bone and arcus tendineus levator ani as a sling around the lateral and posterior anorectum walls and external sphincter ani, and inserting into levator plate, anococcygeal ligament and coccyx

especially the puborectalis muscles, median part of pubococcygeus muscles, play a role pulling the anorectum anteriorly; these muscles are responsible for the anorectal angle; its fibers fuse with the deep portion of the external sphincter ani muscle

**posterior vagina wall**
attached to perineal body and rectovaginal or pre(ano)rectal fascia and rectum serosa

**perianal skin with subcutaneous tissue and constrictor ani muscle**
stabilizes also the anus/sphincter ani muscle

intact innervation of these components

autonomic sympathetic and parasympathetic (vagus) nervous system for the circular smooth muscle as internal sphincter and longitudinal smooth muscle; the sympathetic fibers for stimulation and continence against the parasympathetic fibers for relaxation and defecation; from hypogastric and pelvic plexus
pudendal nerve innervating the external sphincter ani; from s2, s3, s4
levator ani nerve innervating levator ani muscles; from s3, s4
and of course the autonomic enteric nervous system

discussion

the stool continence mechanism must take care of

gas
for final sealing off the mucosa with mucosa cushions and the submucous vascular plexus are responsible
**liquid stool**
for final sealing off also the mucosa with mucosa cushions and the submucous vascular plexus are responsible

**solid stool**
this is the easiest since normally there is no stool inside the rectum

**anorectal angle** is determined by the puborectalis muscle and is normally 80°-100°; if it contracts the angle will become sharper; however, this seems to be of minor importance

**anorectum mucosa with mucosa cushions and submucous vascular plexus** are responsible for air- and water-tight closure; washer effect

water-tight closure is a problem since liquid stool inside the rectum is accompanied by a strong urge component with bowel contractions

linea dentata between squamous epithelium (proctodaeum origin) with sensibility for pain and touch since innervated by pudendal nerve and cubical epithelium (hindgut origin) without sensibility since innervated by autonomic nervous system

**thickened circular smooth muscle = internal sphincter ani** is the strongest factor and responsible for closure due to non-fatigue tonus; it is separated from the external sphincter by the longitudinal smooth muscle layer sheath

**longitudinal smooth muscle** is playing a role in defecation since it will shorten the anorectum if contracting; it separates the internal sphincter ani muscle from the external sphincter ani muscle

**rectovaginal or prerectal fascia (denonvillier)** bilaterally from an arcus tendineus attached to levator ani muscle fascia; this is attached to/supporting the anterior anorectum; if defective a rectocele will develop

**external sphincter ani** circular around the distal anorectum and consists of striated muscle fibers; the slow-twitch muscle fibers are contributing to its tonus whilst the fast-twitch fibers will contribute to short-duration closure of the anus; especially in the female it is thicker posteriorly than anteriorly

it consists of 3 parts: subcutaneous, superficial and deep; fibers of the puborectalis muscle fuse with the deep part bilaterally and posteriorly

it is separated from the internal sphincter by the longitudinal smooth muscle sheath of the anorectum

the external sphincter extends 0.5-1 cm distally from the internal sphincter (intersphincteric groove) and protrudes slightly from the surrounding skin

**perineum outlet diaphragm**
the anorectum with the external sphincter ani complex are firmly anchored into the pierced thru punched out opening within this diaphragm stabilizing/securing these structures in their anatomic position

active contraction of its striated muscle component and reflex contraction of its smooth muscle component will reinforce the stool continence mechanism
**perineal body**

wedge-like connective tissue structure into which the bulbospongiosus and transversus perinei muscles radiate; attached to anterior external sphincter ani

this structure stabilizes and secures the anterior sphincter ani/anorectum in its anatomic position and as such supports the stool continence mechanism

**transversus perinei muscles**

bilaterally from ischium tuberosity and uniting indirectly medially via the perineal body and prevent lateral shifting of perineal body/anus

**bulbospongiosus muscles**

bilaterally from paraclitoridally and uniting posteriorly medially via the perineal body and prevent posterior shifting of perineal body/anus

**levator ani muscles + levator plate**

a flat striated muscle sheath originating anterobilaterally from pubis bone and arcus tendineus of levator ani muscles (atflam) and like a sling around lateral vagina walls and laterally from and underneath sphincter ani/anorectum/rectum and fusing with each other and inserting posteriorly from sphincter ani/anorectum/rectum into levator ani plate, anococcygeal ligament and coccyx bone

though it is one muscle it can be divided into different parts based on their origin: pubococcygeus and obturatococcygeus muscles

the medial part of the pubococcygeus is called the puborectalis muscle; this portion fuses with the bilateral and posterior deep external sphincter ani muscle fibers; it is responsible for the anorectal angle and prevents posterior shifting of the anus

due to its sling-like shape contraction of the levator ani muscles compresses the lateral and posterior anorectum and sharpens the anorectal angle and as such contributes to the stool continence mechanism

for some investigators the (ischio)coccygeus muscle is (synonymous with) the sacrospinous ligament

**posterior vagina wall**

covers and is attached to the perineal body and anorectum/prerectal fascia/rectum (serosa) and as such is fixed indirectly to the lateral pelvis walls

**anococcygeal ligament**

from coccyx bone to posterior sphincter ani/anus/anorectum and stabilizes/secures the external sphincter ani and anus in its posterior anatomic position and prevents anterior shifting of external sphincter ani/anus

**shafik mechanism**

surgically speaking this is difficult to check; as well this could only function if the levator ani muscles are posteriorly uniting around posterior anorectum (true), the anococcygeal ligament around anterior anorectum and/or external sphincter ani and/or perineal body (not true) and bulbospongiosus muscles unite posteriorly from anorectum (not true)

besides this, as long as an anatomically correct reconstruction is performed these structures will be restored as well whatever the arrangement
skin with subcutaneous tissue and corrugator ani muscle
the perianal skin and subcutaneous tissue in combination with corrugator ani muscle around the anus stabilizes the anus as well

intact innervation of these components
autonomic sympathetic, parasym pathetic (vagus) nervous system for the anorectum circular smooth muscle fibers as internal sphincter and longitudinal smooth muscle fibers and for (non)sensibility of anorectum cubic mucosa up to dentate line; from hypo gastric and pelvic plexus; also complex coordination by enteric nervous system

pudendal nerve innervating the external sphincter ani and for sensibility for touch/pain of perianal skin and squamous anorectum mucosa up to dentate line; from s2, s3, s4

levator ani nerve innervating levator ani muscles; from s3, s4

synergistic interaction between stool and urine continence mechanisms
though the two mechanisms may function independently from each other there is a lot of analogy and synergy; for instance first flatus and then micturition (le vent avant la pluie) and first micturition before defecation, combination of cystocele and rectocele, combination of sphincter ani rupture and genuine intrinsic urine incontinence etc

analogy between stool and urine continence mechanism
analogy of functional anatomy: mucosa, submucous vascular plexus, internal smooth-muscle sphincter, external striated-muscle sphincter and support
analogy of posterior support of urethra by endopelvic diaphragm and anterior support of sphincter ani/anorectum by perineal body with transversus perinei and bulbospongiosus muscles and by prerectal fascia
analogy of innervation (pudendal nerve + autonomic nervous system)
and analogy of blood supply (internal iliac artery); and for (ano)rectum also inferior mesenteric artery

direct against indirect action of levator ani muscles
tonus and contraction of levator ani muscles have a direct action upon the stool continence mechanism since lateral/posterior anorectum walls are being squeezed and fibers of puborectalis support deep part of sphincter ani muscle whilst the anorectal angle becomes sharper
tonus and contraction of levator ani muscles have no direct action upon the female urine continence mechanism since there is no direct contact whatsoever between the two; but there is indirect action since the endopelvic diaphragm as attached to anterior vagina wall is moving anteriorly and cephalad by compression of lateral/posterior vagina walls which improves the support

sphincter ani/perineal body complex
schematic drawings of the sphincter ani/perineal body complex with transversus perinei and bulbospongiosus muscles are presented on following page.
true pelvis cavity
a confined space for the distal outlet organs of the urinary tract anteriorly, the genital tract in the middle and the digestive tract posteriorly with hydrostatic and compression pressure; normally in a continent way and divided into

- **anterior pre_subperitoneal compartment**
  for the distal end parts of the urinary tract: pelvic ureters, bladder and urethra

- **median subperitoneal compartment**
  for the (also distal end parts of) genital tract: uterus, adnexa, cervix and vagina

- **posterior retro_subperitoneal compartment**
  for the distal end parts of the digestive tract: rectum, anorectum and sphincter ani

enclosed by
- **parietal pelvis fascia** covering pelvis wall/floor muscles
  and
- **parietal peritoneum** as boundary of intraperitoneal cavity
  as connected to each other by
  - **tela urogenitalis** with corpus intrapelvinum and endopelvic diaphragm

**corpus intrapelvinum as dynamic 3-dimensional matrix**
connective tissue organ of pelvis consists of a cohesive mixture of collagen for strength, elastin for passive elasticity and plasticity and mostly smooth muscle fibers for dynamic active non-fatigue tonus in a loose, dense or condensed form as a dynamic matrix into which the organs and their supply are embedded and suspended/connected to the pelvis wall and each other by highly specialized structures protecting the organs and their supply against trauma and stabilizing/securing them in their variable anatomic position as coordinated by intrinsic myogenic impulses and the autonomic nervous system considered to be a fluidum since no sharp demarcations between the archaic matrix and its specialized structures

**endopelvic diaphragm**
highly specialized structure of corpus intrapelvinum from symphysis anteriorly to sacrum posteriorly as connected to its bilateral arcus tendineus fasciae with cervix as centrum tendineum intrapelvinum since all musculofascia structures are connected to it as first line of counteracting intraabdominal hydrostatic pressure and supporting the urogenital continence mechanisms in their anatomic position and preventing herniation of the urinary tract, genital tract, intraperitoneal contents and distal digestive tract into the zero-pressure vagina

**pelvis floor as one functional unit as part of abdominopelvic wall**
levator ani muscles connected firmly to the perineum outlet diaphragm via perineal body and external sphincter ani muscle supporting and reinforcing each other levator ani muscles as “pelvis diaphragm” highly overrated with direct action on stool continence mechanism and only indirect action on urine continence mechanism perineum outlet diaphragm into which the end outlet organs with their striated sphincter mechanisms are anchored and supporting directly and the urine and stool continence mechanisms
female urine continence mechanism over in total 4-5 cm
bladder neck, uv-junction and whole urethra
supported by the endopelvic diaphragm and the perineum outlet diaphragm
there is an internal smooth muscle sphincter and an external striated rhabdosphincter
with washer effect by the mucosa and submucous vascular plexus
continence potential over its whole length

female genital continence mechanism over in total 3-4 cm
with cervix as internal smooth muscle sphincter as anchored into endopelvic diaphragm

female stool continence mechanism over in total 4-5 cm
anorectum and external sphincter ani
anchored within perineum outlet diaphragm
there is an internal smooth muscle sphincter and an external striated sphincter ani
muscle with washer effect by mucosa and submucous vascular plexus

urine stress incontinence mechanism genuine and post fistula repair
the anterior urethra wall is always fixed to the symphysis and cannot rotate backwards
away from the symphysis whilst the posterior urethra wall is mobile as supported by the
endopelvic diaphragm
once this support becomes weak the posterior urethra wall rotates backwards causing
funneling = vesicalization of the proximal and mid or whole urethra with a decrease in
outflow resistance so that the intrinsic closing forces can no longer counteract the intra
vesical expulsion forces
or by defects within the anchoring into perineum outlet diaphragm; isolated or combined

pelvis floor muscle exercises
may have a positive effect upon the urine and stool continence mechanism since
the perineum outlet diaphragm contributes to the urine and stool continence mechanism
by further stabilizing the outlet parts
the levator ani muscles contribute directly to the stool continence mechanism to which
they are anatomically connected but only indirectly to the urine continence mechanism
with no anatomic connection whatsoever
with simultaneous reflex contraction of the external striated muscle sphincters
with increase in tonus of smooth muscle fibers of the endopelvic diaphragm by reflex
action via intrinsic myogenic impulses as modulated by the autonomic nervous system

obstetric trauma
due to hydrostatic pressure, dilatation of birth canal, (in)direct cutting thru, shearing and
compression; and in prolonged obstructed labor due to pressure necrosis
resulting in an enormous variety of defects from minimal to extensive

pelvis organ prolapse
herniation of adjacent high(er)-pressure organs into the zero-pressure vagina and then
further prolapse thru the vagina dragging vagina wall with them as intussusception
due to defects within the separating and supporting endopelvic diaphragm structures of
the corpus intrapelvinum between these organs and the vagina
levator ani muscles and perineum outlet diaphragm do not play a role in this process
since there is no anatomic contact between those organs and these structures

reconstructive surgery
the science is to identify the specific defects whilst the art is to reconstruct the functional
anatomy using the available dynamic autologous structures
endopelvic diaphragm
smooth muscle
intrinsic myogenic impulses
modulated by autonomic innervation

perineum outlet diaphragm = pelvis floor
striated muscle
somatic innervation
pre-, intra- and postoperative management of rectovaginal/stool fistulas

the fistula is closed during the surgical process of reconstructing the functional pelvis anatomy

**the better the organization** of the preoperative preparation, of the operation theater and of the postoperative care **the better the outcome of fistula surgery** in terms of closure and continence and **the better the chance of medical, physical, mental and social rehabilitation**

**first visit of patient**
- extensive history
- clinical check-up; with vaginal examination
- special attention to other lesions due to obstructed labor: ulcers, foot drop etc

**preoperative preparation**
- oral hematinics and high-protein diet; **no antibiotics**
- full mobilization; if needed with stick

**laboratory, blood bank and X-rays**
- Hb/Ht and serum creatinine
- a blood bank is complicated
- X-rays are not indicated

**examination**
- normal vaginal examination at first visit and day before operation
- **eua (examination under anesthesia) is utterly nonsense if it is not followed up immediately by surgery in the same session**

**timing of fistula management**
- the management has to start the moment the passing of stools is manifest
- then for early closure as soon as wounds are clean

**equipment**
- a well functioning hydraulic operating table with 45-50° inclination is a must

**special surgical instruments**
- self-retaining weighted **auvard** speculum, long vaginal instruments, sharply curved **thorek** scissors, sharp **deschamps** aneurysm needle

**suturing materials**
- polyglycolic acid and nylon; expensive atraumatic suturing materials are not required
anesthesia
spinal anesthesia with a long-acting agent, e.g. hyperbaric bupivacaine 0.5%

manpower
only the surgeon and one instrumentating operation theater nurse
one retractor inside the vagina is already a crowd

operation route
the vagina in kees I through kees IIb fistulas; exceptionally and for type kees III fistulas other routes may be necessary
the abdominal route is not advanced surgery but a lack of surgical skills

position on the operation table
exaggerated lithotomy position with the legs flexed and slightly abducted in the leg holders

accessibility
by median, uni- or bilateral episiotomies

examination under anesthesia
this is done by any surgeon for whatever surgery at the beginning of any operation; the fistula is classified and a final decision taken how to tackle this specific fistula

colostomy for decompression
complete decompression not guaranteed
the author has never used it for his obstetric trauma surgery

prerectal fascia of endopelvic diaphragm
any defect has to be repaired meticulously

the martius fibrofatty pad graft or any other kind of grafting
does not contribute either to closure or to continence

indwelling bladder catheter for 2-3 days
foley catheter ch 18

postoperative fluid intake
high oral fluid intake

vagina pack
no routine vagina pack; good check on hemostasis

antibiotics
only on strict indications, e.g. pneumonia
the indiscriminate use of antibiotics only leads to multi-resistance

mobilization
full mobilization the morning following surgery

stool softeners
for 10-14 days
postoperative stool incontinence only in kees IIb fistulas
if necessary raphy of internal sphincter with raphy of external sphincter with reconstruction or reinforcement of perineal body

social rehabilitation
only by successful repair; then it takes place spontaneously

future subsequent pregnancies/deliveries
regular antenatal care with delivery in hospital by elective cesarean section
since labor assistance/monitoring is very poor in most instances

tissue quality
at operation end the tissue quality is documented as good, medium or poor
only for predicting prospective results; not for operation techniques

residual fistulas
the same technique as if it were the first attempt

principles of surgical technique(s)
the vaginal approach is the route of choice with or without unilateral, median or bilateral episiotomies, spinal anesthesia is the anesthesia of choice and the (exaggerated) lithotomy position is the position of choice for kees Ia thru kees IIb fistulas; however, kees III fistulas may need a different approach

the fistula is classified by careful inspection and systematic examination of the complex obstetric trauma under spinal anesthesia just before the surgery is started and a final decision taken how to handle that specific fistula

an incision is made at the fistula edge, if needed with bilateral transverse extension, a sharp dissection of the rectum/prerectal fascia performed and the rectum closed without tension by two layers of inverting polyglycolic acid sutures taking good bites of the prerectal fascia/muscularis

the principles of reconstructive surgery and common sense dictate the direction of closure: longitudinal, transverse or oblique;

the posterior vagina wall is only adapted or half closed, and in severe contamination only approximated, to allow free spontaneous evacuation of small blood clots, tissue debris and bacteria according to the principles of septic surgery
postscriptum
grafting by gracilis muscle tendon transfer

due to his reconstructive surgery in leprosy the author is familiar with dynamic tendon transfers as used for mobile foot drop and mobile claw hand in leprosy patients which provided him ample opportunity to study the mechanism of skeletal striated muscle action and the reason for and functioning of dynamic tendon transfers

skeletal striated muscle can only function by contraction if the muscle is physiologically stretched before by antagonistic muscle action

if there is no stretching the muscle with tendon will stay more or less in a “contracted” state, degenerate and lose its dynamic function; see poliomyelitis

the ratio for tendon transfer is to replace the function of a paralyzed muscle by transferring the tendon of a “similar” muscle into a fixed point under stretching; however, its original function is then lost and it is always a compromise

the patient has to learn the isolated function of the to be transferred muscle before so that (s)he can train its new function under supervision until the able brain will do this automatically

the obstetric trauma/fistula surgery is complicated whilst the postoperative results are not what one is expecting

so, the surgeon as the decisive factor has to find out what exactly went wrong by first analyzing his theoretic knowledge and his own technical performance before blaming other things and persons in order to devise the optimal technique which he is able to defend from a scientific view and from evidence-based results

some surgeons are of the opinion that tissue grafting will contribute to better results as to closure and as to continence blaming other things for their failure

however, before engaging in such practices one needs a clear theoretic and practical picture of how grafting could be of help and what exactly is being done

for some surgeons the gracilis muscle tendon transfer seems to be the ultimate solution in obstetric fistula surgery and especially in external sphincter ani replacement and/or reinforcement

by releasing the gracilis muscle tendon from its insertion into the medial aspect of the tibia one removes the stretching effect of the antagonist muscle(s) required for muscle contraction and if it is not reinserted under tension to a fixed point (with antagonistic stretch) the muscle will degenerate with loss of its function

in using the gracilis muscle tendon as substitute of or for reinforcing the sphincter ani the tendon is reinserted into the ischium tuberosity whereby the muscle and tendon will be configurated as a U sling where the antagonistic stretching will be (almost) nihil; with the closed U point at the entering of the blood supply and innervation some 10 cm from its origin the anterior pubis bone body/inferior ramus
so there can never be a stretch effect and by contracting the effect is unpredictable because of the new loose sliding U configuration of the muscle
due to the necessary tunneling with additional trauma and raw surface the muscle tendon may get stuck within this tunnel
the gracilis muscle constitutes a fatigue-prone type II fiber though a nonfatigue-prone type I fiber is needed for a more or less continuous tonus; some surgeons claim that this can be achieved by repeat electric stimulation via a pacemaker
so, comes in the dynamic gracilis muscle tendon transfer with pacemaker stimulation
however, if the striated muscle is not stretched in between, the electric stimulation will not result in contraction; and stretching the striated muscle in a U configuration is almost impossible
even if stretching under tension is possible how much tension is needed since too little will result in incontinence and too much will result in defecation obstruction
then how is relaxation of the gracilis tendon “external sphincter ani muscle” coordinated with the other processes involved just before or during defecation; by switching off the pacemaker?
the gracilis muscle is skeletal striated muscle whilst the external sphincter ani is a non-skeletal visceral striated muscle whereby relaxation is as important as is “contraction” tonus
the author could not find in the literature a “large” series of some 50 or 100 consecutive procedures with results
in the complex sphincter ani rupture good anatomic and functional results are achieved by using the available structures; unless seldomly there is major tissue loss which will make it unrepairable as has been outlined in this evidence-based book
so the author never performed a gracilis muscle tendon transfer for reconstruction and/or reinforcement of the external sphincter ani rupture since first, there is no need for it and second, a solid theoretic and practical background is missing and third, the author is of the opinion that it will do more harm than good
other surgeons may be of a different opinion which is their full right in a free world

the main question is: will the patient benefit or not
### abbreviations

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<th>Abbreviation</th>
<th>Full Form</th>
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<td>vvf</td>
<td>vesicovaginal fistula</td>
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<tr>
<td>rvf</td>
<td>rectovaginal fistula</td>
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<tr>
<td>uvvf</td>
<td>urethrovaginal fistula</td>
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<td>vcvf</td>
<td>vesicocervicovaginal fistula</td>
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<td>vuvf</td>
<td>vesicouterovaginal fistula</td>
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<td>cx</td>
<td>cervix</td>
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<td>avw</td>
<td>anterior vagina wall</td>
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<td>pvw</td>
<td>posterior vagina wall</td>
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<tr>
<td>pcmuf</td>
<td>pubocervical musculofascia</td>
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<tr>
<td>atf</td>
<td>arcus tendineus fasciae</td>
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<tr>
<td>atlam</td>
<td>arcus tendineus of levator ani muscle</td>
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<td>lam</td>
<td>levator ani muscle</td>
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<tr>
<td>pcm</td>
<td>puboccocygeus muscle</td>
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<tr>
<td>ocm</td>
<td>obturatococcygeus muscle</td>
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<tr>
<td>iscm</td>
<td>(ischio)coccygeus muscle</td>
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<tr>
<td>oim</td>
<td>obturator internus muscle</td>
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<tr>
<td>pm</td>
<td>piriformis muscle</td>
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<td>sul</td>
<td>sacrouterine ligament</td>
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<td>broad ligament</td>
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<td>cl</td>
<td>cardinal ligament</td>
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<td>endopelvic diaphragm</td>
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<td>charrière</td>
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<td>subtotal hysterectomy</td>
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<td>tah</td>
<td>total abdominal hysterectomy</td>
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<tr>
<td>tvh</td>
<td>total vaginal hysterectomy</td>
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</table>
euo = external urethra opening
iuo = internal urethra opening
uv(-junction) = urethrovesical (junction)

euo/f = distance between euo and fistula
f/c = distance between fistula and cervix
f/v = distance between fistula and vagina vault
ab/au = distance between anterior bladder and anterior urethra in circumferential fistulas
euo/b = distance between euo and catheter balloon
euo/bw = distance between euo and bladder wall (fundus)

a/f = distance between anus and (rectovaginal) fistula

i/v = distance between introitus and vagina vault; vagina length

pa = pubic arch
ap = anterior to posterior pelvis diameter
ar = anal reflex

gm = gastrocnemius muscle
sm = soleus muscle
at = achilles tendon

min = minute
hr = hour
wk = week
mth = month
yr = year

R = right
L = left

reference point urine fistulas: external urethra opening = euo
reference point stool fistulas: anus opening = a
normal pelvis measurements

vagina length  10-12 cm

euo/c  6-7-8 cm

anatomic urine continence mechanism  4-5 cm
anatomic stool continence mechanism  4-5 cm

urethra length  3.0-3.5 cm

however, during surgery it is more in the range of 2.5-3 cm; exceptionally 5 cm

longitudinal bladder diameter (euo/bw minus euo/b)  7-12 cm

anorectum  4-5 cm

symphysis  5-6 cm broad
axis inclination  30-45° as to horizontal in the upright position

pubic arch  85-90°

atf  7.5-8 cm
inclination  25-30° as to horizontal from pubis bone body to ischium spine

atlam  7-7.5 cm
inclination  25-30° as to horizontal from pubis bone body to ischium spine

angle between symphysis and atf/atlam  110-125°

inter ischium spine distance  10 cm

inter ischium tuberosity distance  10-11 cm

pelvis inlet plane  inclination 55-60° to horizontal from superior symphysis edge to promontory in the upright position

pelvis outlet  inclination 10-15° to horizontal from inferior symphysis to tip of coccyx in the upright position

anterior triangle pelvis outlet from inferior symphysis to ischium tuberosity in one plane with -10 to-15° inclination to horizontal in upright position

posterior triangle pelvis outlet from ischium tuberosity to tip of coccyx in one plane with 65-70° inclination as to horizontal in upright position

angle anterior perineum/posterior perineum 75-85°/95-105°
pelvis outlet surface 75-80 sq cm

gap between levator ani ledges 25-30 sq cm

diameter recta from inferior symphysis up to tip of coccyx 9-9.5 cm; up to 10.5-11 cm during delivery

perineum outlet

spb = symphysis to perineal body 3.5-4.5 cm

pb height 2-2.5 cm

anus (+ sphincter) diameter 1.5-2 cm

pac = anus to coccyx bone 4-5-6 cm

ischium spine to upper brim ilium bone 6-7 cm

area of parametrium

ischium tuberosity to upper brim ilium bone 9 cm

rectum 12-15 cm from upper edge S3 to anus

bladder capacity by longitudinal diameter (euo/bw minus euo/b)

small < 4 cm

moderate 5-6 cm

normal 7-12 cm

transitional 13-14 cm

increased ≥ 15 cm

reference point urine fistulas

reference point stool fistulas

external urethra opening = euo

anus opening = a
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29,000 obstetric trauma procedures as covered by 30 annual evaluation reports

and as influenced by many others since the author started his medicine study in 1959
but especially by prof j m greep, prof t k a b eskes and dr med h stenkhoff
documentation

operation reports
  anorectum/sphincter ani/perineal body reconstruction
  circumferential vvf repair combined with IIb reconstruction

step-by-step photography
  operation techniques
measuring pubic arch in degrees

sphincter ani rupture

stretching sutures

deep dissecting incision between distal pvw/anorectum freshening sphincter ends

deep dissecting incision

anorectum closure
anorectum closed

sphincter ani suturing superficial, deep and subcutaneous parts

perineal body reconstruction

perineal body reconstruction

narrow anus
dilatation

© kees
after severing perineum

reconstructed

surgical mutilation

anterior sphincter defect

detail

reconstructed

everything normal

© kees
amyd (rép niger)  female  18 yr  11.07.13

surgeon:  kees waaldijk
assistant:  kabir lawal

diagnosis:  PIII (2 alive), sphincter ani rupture IIb with 1.5 cm longitudinal anorectum trauma, stool flatus incontinence for 63 days that started immediately following last labor for 1 day, in hospital live male, married 5 yr ago post (menarche 3 mth earlier), still living with husband, no menstruation, drop foot R (grade 5) and L (grade 5), no vvf, no yankan gishiri, no eclampsia; normal ap diameter/wide pubic arch 95%, ar pos, immediate suturing pp s end R at 9 hr and L at 3 hr
a/f 0 cm, i/v 12 cm  never leaking urine  144.5 cm

operation:  anorectum + sphincter ani + perineal body reconstruction
duration:  40 min (step-by-step teaching)  healing 95% continence 95%
anesthesia:  spinal L4/L5 with 3 ml bupivacaine 0.5%

deep dissecting incision at pwv edge with freshening of sphincter ani ends, no further dissection, longitudinal anorectum closure with adaptation_raphy of internal sphincter over 2.5 cm up to anocutaneous junction (with repositioning of anterior anus) by double layer of inverting interrupted/continuous serafit, inner ring of external sphincter adapted, end-to-end sphincter ani reconstruction by 3x serafit, perineal body repair with (in)direct re-union of transversus perinei muscles and (in)direct posterior re-union of bulbocaver nosus muscles by 3x serafit starting para-anally, perineum well adapted with anus in anatomic position, check on hemostasis

foley ch 18; free urine flow, euo/bw 13 cm, moderate elevation, euo/b 2 cm
11.08.13  stools ok, not leaking at all
19.08.13  stool/flatus ok, full continence  both sphincter/perineum healed
23.09 + 16.11.13  idem
06.01.14  full stool/flatus continence  both healed

RR
preanesthesia:  120/70 mm Hg
5':  120/70
10':  120/70
postoperation:  120/70
sphincter reconstructed

still perineal body rupture

perineal body reconstruction

perineal body reconstruction

end of reconstruction

everything normal
Pt 5479
Pt 677
Katsina
VVF 7008
Rvf 891
Step-by-step documentation _ Book etc
UAG (Zamfara City)
Female 22 yr 18.02.07
Surgeon: Kees Waaldijk
Assistant: Sa Adatu Ibrahim
Diagnosis: PII (1 alive), multiple small fistulas R_mid_L as part of _3 cm 0 urethra vesicovaginal fistula with circumferential defect IIAb, sphincter ani rupture with 1.5 cm longitudinal anorectum trauma, leaking urine/flatus_diarrheic stool incontinence for 2 yr which started immediately following cs bco first obstructed labor of 2 days, SB male, married 10 yr ago pre(menarche 1 yr later), still living with second husband, normal menstruation, no (h/o) drop foot R (grade 5) and L (grade 5), no yankan gishiri; normal AP diameter/pubic arch 95°, AR pos, pcm paraurethra atf/atlam loss, 2° cervix pro lapse out of vulva, operated vvf/rvf 1x (gusa_sa) referral
euo/f 2 cm, f/c 4 cm, ab/au 1 cm, a/f 0 cm 154.0 cm
Operation: circumferential uvvf-repair, rectum sphincter_perineal body repair
duration: 80 min healing both 95% continence u_st 85_95%
anesthesia: spinal L4/L5 with 3 ml bupivacaine 0.5%
Transverse incision thru all fistulas, sharp circumferential dissection, advancement/caudad fixation of anterior bladder onto symphysis/urethra, tension-free circumferential uvvf-repair by end-to-end vesicourethrostomy by single layer of inverting serafit, bilateral paraurethra fixation of pc mufascia onto "atf" by 1x serafit each side, triple fixation of foley ch 18, transverse avw/avw_cervix adaptation by 2x everting seralon; free urine flow, euo/bw 12 cm, good anterior elevation, euo/b 2.2 cm (circ loss) normal bladder capacity (longitudinal diameter 12-2.2 _10 cm) cervix far better good position of UV-junction fixed against middle third symphysis normal-width 2 cm medium-utility urethra_euo in anatomic position transverse incision at pvw edge, sharp dissection, pararectal_anal mobilization, tension-free longitudinal anorectum closure with internal sphincter adaptation_rhaphy by double layer of inverting interrupted/continuous serafit, sphincter ani reconstruction by 2x sera fit, perineal body repair by 1x serafit, deep low-tension perineum adaptation, pack 19.03.07 not leaking at all, stools ok cath removed bladder drill
26.03.07 not leaking, incontinence , normal miction stools ok
Insp/both healed, good elevation, stress incontinence so
Preanesthesia: 155/90 mm Hg
5': 130/85
10': 130/80
Postoperation: 125/70
sphincter ani rupture
circumferential vvf
total cervix prolapse
wide pubic arch

sphincter ani rupture

total cervix prolapse

type IIAb urine fistula

avw tissue bridge

circumferential defect
after severing tissue bridge
end-to-end vesicourethrostomy
end-to-end vesicourethrostomy
end-to-end vesicourethrostomy
end-to-end vesicourethrostomy
continue with sphincter reconstruction
sphincter ani reconstruction
same session
bilateral stretching sutures
deep dissecting incision

no further dissection

anorectum raphy

rhaphy completed

sphincter ani reconstruction

end of operation
both vvf + sphincter reconstructed
irreparable sphincter ani rupture
irreparable type IIb urethrovaginal fistula
extensive obstetric trauma
extensive tissue loss
everything fixed
vagina atresia
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<td>Kees Waaldijk</td>
<td>Printmarkt 2020</td>
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<td>Kees Ic stool fistulas</td>
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<td>Printmarkt 2021</td>
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</tbody>
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