CHAPTER 12

Summary

Chapter 1 provides a general Introduction of this thesis entitled: **"**Total laparoscopic sigmoid vaginoplasty: A novel technique for primary and revision vaginoplasty". Especially in cases with penoscrotal hypoplasia after puberty suppressing hormonal treatment, standard penile inversion technique is not an option due to insufficient penile skin. If primary vaginoplasty fails, multiple surgical approaches exist, but there is an elevated chance of complications. Since 2008 we perform primary and later on also revision intestinal vaginoplasties by laparoscopy on a regular basis.
In this thesis we create a detailed overview of the published outcomes of all currently available techniques for vaginoplasty in male-to-female transgenders in general and intestinal vaginoplasty in particular. We also describe the laparoscopic sigmoid vaginoplasty technique, and comprehensively assess the outcomes of the primary and revision procedures and our experience and results obtained in the diagnosis and management of neovaginal fistulas after primary and revision vaginoplasty.
Because the incidence and prevalence of diversion colitis of the intestinal neovagina is still uncertain, we prospectively determined the endoscopic and clinical characteristics of diversion neovaginitis after sigmoid vaginoplasty.

PART I REVIEW OF LITERATURE

In ***chapter 2*** we provided a systematic review of surgical techniques for Vaginoplasty in Male-to-Female transgenders. Twenty-six studies satisfied the inclusion criteria. The majority of these studies were retrospective case series of low to intermediate quality. Outcome of the penile skin inversion technique was reported in 1461 patients, bowel vaginoplasty in 102 patients. Neovaginal stenosis was the most frequent complication in both techniques. Sexual function and patient satisfaction were overall acceptable, but many different outcome measures were used. Quality of Life was only reported in one study. Comparison between techniques was difficult due to the lack of standardization. The penile skin inversion technique is the most reported surgical procedure. Outcome of bowel vaginoplasty has been reported less frequently, but does not seem to be inferior. The available literature is heterogeneous in patient groups, surgical procedure, outcome measurement tools and follow-up.

In ***chapter 3*** we reviewed Surgical Techniques, Complications and Sexual Function in intestinal vaginoplasty. Studies were included if these included at least five patients and had a minimal follow-up period of 1 year. No constraints were imposed with regard to patient age, indication for vaginoplasty, or applied surgical technique.
Twenty-one studies on intestinal vaginoplasty were included (including 894 patients in total comprising of 726 with sigmoid and 168 with ileum). All studies had a retrospective design and were of low quality. None of those studies provided a rationale for choosing either ileum or sigmoid as the graft donor site. Prevalence and severity of procedure-related complications were low. The main postoperative complication was introital

stenosis, necessitating surgical correction in 4.1% of sigmoid-derived and 1.2% of ileum-derived vaginoplasties. Neither diversion colitis nor cancer was reported. Sexual satisfaction rate was high, but standardized questionnaires were rarely used. Quality of life was not reported.
Based on evidence presently available, it seems that intestinal vaginoplasty is associated with low complication rates.

PART II SURGICAL TECHNIQUES AND OUTCOMES

In ***chapter 4*** our original technique for total laparoscopic sigmoid vaginoplasty is shown on video.
Given current literature, intestinal vaginoplasty is associated with low complication rates. Since 2008 our group performed 42 primary and 21 secondary procedures, mainly in transgender women, with at least one year of clinical follow-up. Complications comprised three rectal perforations and two anastomotic leakages. These were addressed laparoscopically without long-term fistula formation. There were no conversions to laparotomy. Total laparoscopic sigmoid vaginoplasty is a feasible and safe procedure in the hands of an experienced team with the right infrastructure. It provides good surgical and functional results. In selected cases, it is indicated for primary vaginoplasty as well as for revision vaginoplasty.

In ***chapter 5*** we prospectively assessed surgical outcomes and long-term follow-up of primary total laparoscopic sigmoid vaginoplasty in a cohort of transgender women with penoscrotal hypoplasia.
From November 2007 to July 2015, 42 young transgender women underwent total laparoscopic sigmoid vaginoplasty as primary vaginal reconstruction. There were no conversions to laparotomy. One rectal perforation was recognized during surgery and immediately oversewn without long-term consequences. One patient deceased due to an ESBL necrotizing fasciitis leading to septic shock with multi-organ failure. Direct postoperative complications that needed laparoscopic reoperation occurred in three cases (7.1%). In seven cases (17.1%) long-term complications needed a secondary correction. After one year all patients had a functional neovagina with a mean depth of 16.3 ± 1.5cm.
Total laparoscopic sigmoid vaginoplasty seems to have a similar complication rate as other types of elective laparoscopic colorectal surgery. Primary total laparoscopic sigmoid vaginoplasty is a feasible and safe gender confirming surgical technique with good functional outcomes for transgender women with penoscrotal hypoplasia.

In ***chapter 6*** we assessed patient-reported functional and aesthetic outcomes, quality of life and satisfaction, as well as sexual well being after primary total laparoscopic intestinal vaginoplasty in young transgender women with penoscrotal hypoplasia. From

November 2007, we performed a survey study on transgender women who underwent primary total laparoscopic intestinal vaginoplasty with at least one year of clinical follow-up. Consenting women were asked to complete a combined questionnaire of the Subjective Happiness Scale (SHS), the Satisfaction With Life Scale (SWLS) and the Cantril's Ladder of Life Scale, the Female Sexual Function Index (FSFI), the Female Genital Self-Imaging Scale (FGSIS), the Amsterdam Hyperactive Pelvic Floor Scale-Women (AHPFS-W), and a questionnaire addressing postoperative satisfaction. Thirty-one transgender women completed the questionnaires (median age at time of surgery 19.1 years), after a median clinical follow-up 2.2 years. This group of relatively young transgender women reported satisfactory functional and aesthetical results of the neovagina and a good quality of life, despite low FSFI scores.

In ***chapter 7*** *a* comparison of surgical outcomes of laparoscopic intestinal versus perineal full thickness skin graft revision vaginoplasty is presented. Via a retrospective chart review of patients who underwent revision vaginoplasty at our institution patient demographics, surgical characteristics, complications, hospitalization, reoperations and neovaginal depth for both surgical techniques were recorded and compared. This consecutive series of 50 transgender and three biological women underwent revision vaginoplasty, of which 21 laparoscopic intestinal and 32 perineal FTG vaginoplasties, with a median clinical follow-up of 3.2 years (range 0.5-19.7). Patient demographics did not differ significantly. There was no mortality. Two (10%) intraoperative rectal perforations occurred in the intestinal group versus six (19%) in the FTG group. Operative time was shorter for the FTG vaginoplasty group. Hospitalisation length did not differ significantly. Successful vaginal (re)construction was achieved in 19 (91%) intestinal and 26 (81%) FTG vaginoplasty procedures. A deeper neovagina was achieved with intestinal vaginoplasty. It can be concluded that both laparoscopic intestinal and perineal FTG vaginoplasty can be employed as secondary vaginal reconstruction. Intra- and postoperative complications do not differ significantly, but rectal perforation was more prevalent in the FTG vaginoplasty group. Although the operative time of laparoscopic intestinal vaginoplasty is longer, adequate neovaginal depth was more frequently achieved than secondary perineal FTG vaginoplasty.

In ***chapter 8*** our experience and results obtained in the management of neovaginal fistulas after vaginoplasty as gender confirming surgery in transgender women is described. Patients were retrospectively identified from our departmental database of 1082 transgender women who underwent 1037 primary and 80 revision vaginoplasty procedures between 1990 and 2015. Patient, clinical, surgical, and outcome characteristics were reviewed. We treated 25 (2.3%) patients for 13 rectoneovaginal, 11 urethroneovaginal and 1 pouch-neovaginal fistulas. Patients undergoing revision vaginoplasty were at higher risk of rectoneovaginal fistula development (0.8% vs 6.3%). Of 23 intraoperatively identified and oversewn rectal perforations, four (17.4%) patients

developed a rectoneovaginal fistula. In 4 patients, faecal diversion was achieved through temporary colo or ileostomy with direct or delayed fistula closure. In 6 patients, an urethroneovaginal fistula arose after a complication, such as meatal stenosis. Two patients underwent temporary suprapubic cystostomy for urinary diversion. In most patients, fistulectomy and primary closure or a local advancement flap was sufficient to treat the fistula.
We conclude that neovaginal fistulas are uncommon after vaginoplasty. Symptoms of neovaginal fistulas are comparable to those of vaginal fistulas. In most patients, the diagnosis can be made based on symptoms and physical examination alone. It seems that a complicated course (e.g. intraoperative rectal perforation or meatal stenosis) predisposes for fistula formation. Surgical repair of neovaginal fistulas is associated with few intra- and postoperative complications and does not seem to impair neovaginal function.

PART III LONG TERM FOLLOW UP

In ***chapter 9*** we observed the endoscopic signs of neovaginal inflammation in patients that underwent sigmoid vaginoplasty. Patients were invited yearly to undergo neovaginoscopy and sigmoidoscopy, preceded by medical history taking and physical examination, as routine follow-up. Thirty-four patients with a sigmoid neovagina underwent a total of 43 combined neovaginoscopies and sigmoidoscopies. After a mean postoperative time of 23 months, the most notable endoscopic features of the sigmoid-derived neovagina comprised a diminished vascular pattern, oedema, granularity, friability, decreased resilience and erythema. In the control rectosigmoidoscopy images, no concurrent abnormalities were observed. When applying the MAYO-score, a semiquantative score assessing severity of mucosal colonic inflammation, to the neovaginal images, 12 (35%) patients scored MAYO 0, 19 (56%) MAYO I, 3 (9%) MAYO II and none MAYO III. The presence of neovaginal discharge and malodour correlated with inflammatory endoscopic alterations.
We conclude that the endoscopic appearance of a sigmoid derived neovaginoplasty differs significantly from that of the remaining rectosigmoid. Inflammatory changes of the sigmoid-derived neovagina were observed in the majority of patients. Clinically, the inflammatory changes appear similar to those encountered in diversion colitis.

In ***chapter 10*** the surgical and long-term psychological outcomes of secondary intestinal vaginoplasty performed between 1970 and 2000 in transgender women is assessed. Transgender women who underwent intestinal vaginoplasty between 1970 and 2000 were identified from our hospital registry. Demographics, surgical characteristics, complications and reoperations were recorded. Traceable women were invited to fill out a set of questionnaires (a Quality of Life questionnaire, the Female Sexual Function Index, the Amsterdam Hyperactive Pelvic Floor Scale - Women, the Female Genital Self-

Imaging Scale, and a self-evaluation of vaginoplasty questionnaire) and attend the outpatient clinic for physical, endoscopic and histological examination of the neovagina. Twenty-four transgender women were identified who underwent intestinal vaginoplasty as secondary procedure between 1970 and 2000. There were no intraoperative complications. Three intestinal neovaginas were surgically removed due to postoperative complications. Nineteen women (79%) underwent one or more genital reoperations, most commonly introitus plasty (n=13, 54%). Five women were deceased at time of analysis. Nine women consented to partake in the study (median age 58 (range 50-73) years, median postoperative time 29.6 (range 17.2-34.3) years. They were generally satisfied with life and scored 5.9 out of 7 on a subjective happiness scale. Neovaginal functionality was rated 7.3 and appearance 7.4 out of 10.
We conclude that in our institution, intestinal vaginoplasty before 2000 was always performed as a revision procedure after a previous vaginoplasty had failed. Although surgical corrections were frequently necessary, women reported to be satisfied with the surgical outcome and with life in general.

PART IV AN UNUSUAL CASE

Chapter 11 describes a 25-year-old female kidney transplant recipient with Frasier syndrome who successfully underwent a total laparoscopic colocolpopoiesis without any complications.
Frasier syndrome (FS) is a rare autosomal recessive disorder which presents with male pseudohermaphroditism with gonadal dysgenesis, renal failure in early adulthood and increased risk of developing gonadoblastoma. Kidney transplant recipients are reported to have a high complication rate after colorectal surgery, most probably resulting from immunosuppressive therapy.
There was no short-term morbidity and no complications up to 3 years postoperatively. She was able to engage in neovaginal penetration. We advocate considering a total laparoscopic approach whenever rectosigmoid colocolpopoiesis is indicated, even after kidney transplantation.