



Single Center Experience of Inferior Gluteal Artery Myocutaneous Flap for Reconstruction of the Pelvic Floor after Abdominoperineal Excision

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Abstract

Aim: Closure of perineal wounds after extensive surgery with different tissue flaps has been described. We evaluated the Inferior Gluteal Artery Myocutaneous (IGAM) flap in reconstruction of the perineum and investigated the Quality Of Life (QoL) in these patients.

Methods: All patients with anorectal cancer receiving abdominoperineal excision and IGAM flap at Aarhus University Hospital between 2008 and 2017 were included. Patient records were searched for information on patient characteristics, surgery, and postoperative complications. QoL questionnaires were sent to all patients.

Results: Nineteen patients were included. After 3 months 37% had experienced minor wound complications and 5% major wound complications. No total flap necrosis or perineal hernias were seen. The QoL was good with 50% of the patients reporting minor pain and the remainder no pain. 75% of the patients were satisfied and would recommend the same to others.

Conclusion: The IGAM flap is a robust and safe option for use in selected cases.

Keywords: IGAM; Abdominoperineal excision; Flap reconstruction; Pelvic malignancy; Colorectal cancer

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Introduction

Advanced pelvic cancer calls for complex and extensive surgery with wide resections to achieve free resection margins which is a strong predictor of preventing recurrence [1-4]. Pelvic exenteration and abdominoperineal resections can result in large perineal defects that cannot be closed primary and, therefore, requires reconstruction. Complications including infection, delayed wound healing, herniation, or fistula at the site of the perineal wound are common and reconstruction with a flap provide opportunity to minimize the tension and fill the pelvic dead space. However, a robust reconstructive technique is needed to reduce the risk of morbidity as the surgery is performed not only in a field with an advanced or recurrent malignancy but also a field that may have been subject to neoadjuvant therapy.

Several methods are available for reconstruction of defects in the pelvic floor including the Vertical Rectus Abdominis Myocutaneous Flap (VRAM), the gracilis myocutaneous flap, the gluteal flap, and the Inferior Gluteal Artery Myocutaneous Flap (IGAM). The VRAM- flap uses a myocutaneous flap of the rectus abdominis muscle, while the gracilis flap uses the gracilis muscle from the thigh [5,6]. The IGAM flap is based on the part of the gluteus maximus muscle supplied by the inferior gluteal artery. This flap has been used since 1990 after first being described by Baird et al. [7]. The standard procedure at our institution has been closure of perineal defects using a VRAM flap. However, in selected cases we have used the IGAM flap: If the patient was at high risk of donor site morbidity, if the abdominal part of definitive surgery could be performed laparoscopically, or if the blood supply of the rectus muscles were compromised after previous surgery. Data on morbidity and Quality of Life (QoL) in these patients are still limited.

The aim of this study was to present this reconstruction method and to examine the outcome of IGAM-flap reconstruction after surgery for pelvic malignancy and to investigate the QoL.

Methods and Patients

The study included all patients undergoing surgery with an abdominoperineal excision and IGAM flap for anorectal cancer at Aarhus University Hospital from January 2008 to January 2017. The records were reviewed for information on patient characteristics, surgical procedures, and postoperative complications. Postoperative complications were assessed after 90 days and classified according to Clavien Dindo [8].

After the abdominal procedure the patient was turned into prone jack knife position followed by removal of the tumor and the rectum. The inferior gluteal artery was identified and marked bilateral using Doppler ultrasound. The plastic surgeon carefully raised the flap from the inferior part of the gluteus muscle and transposed it into the defect. Before the flap was sutured the defect into the abdomen was closed using a porcine collagen mesh (Permacol, TSL/Covidien, Leeds, UK) to prevent later development of a perineal hernia. A strict postoperative regime was used to ensure minimal pressure on the flap: Sitting was avoided for 7 days and then gradually increased mobilization. Sutures were removed after 14 days. The abdominal procedure was performed by an experienced colorectal surgeon. All flap procedures were performed by the same Plastic Surgeon (PS).

All postoperative complications were registered and the patient was evaluated after 3 months in the outpatient clinic. Superficial wound complications such as infection or dehiscence with no surgical intervention was defined as minor complication. Major wound complications were defined as complications requiring surgical interventions including flap failure.

QoL and functional outcome after perineal reconstruction was assessed by validated questionnaires: The Colostomy Impact Score [9], the ICIQ Lower Urinary Tract Symptoms for male and female respectively [10,11], the Rectal Cancer Pain Score [12], the International Index for Erectile Function for men [13], the Rectal Cancer Female Sexuality Score [14], and the European Quality of Life (EQ-5D) [15]. The patients were also asked if they were satisfied with the operation and would recommend it to others. The questionnaires were sent to the patients in May 2020.

REDCap [16] and Stata version 16 [17] was used for data processing. Data are given as mean with range in parenthesis.

Results

A total of 19 patients (11 males and 8 females) underwent surgery for anorectal cancer with reconstruction using the IGAM-flap. Ten patients were alive at the time of QoL data collection. Patient characteristics are presented in Table 1. Mean age for all patients was 66.3 years (43 to 85), 74% had an ASA score ≤ 2 , and 69% had a WHO performance score ≤ 1 . Figure 1 shows the postoperative result of reconstruction with the IGAM flap in a typical case.

In 12 (63%) cases the IGAM flap was used as reconstruction after primary anorectal surgery, two patients (11%) had secondary IGAM flap due to failure of primary flap, and in five cases (26%) the patients had surgery with IGAM-flap due to anorectal recurrence (after either radiotherapy or surgery). Ten (53%) patients received an open abdominal procedure and 9 (47%) received minimal invasive surgery (5 patients laparoscopic and 4 robot assisted surgery). The majority (79%) received neoadjuvant therapy (8 patient's radiotherapy, 6 chemo-radiotherapy, 1 brachytherapy).



Figure 1: Reconstruction using the IGAM flap (Consent given by patient).

Mean hospital stay was 21 days (4 to 86 days). At 3 months follow up minor wound complications had occurred in 7 (37%) cases (Table 2). Four of these experienced complete wound healing between 1 and 3 months follow up. One patient had surgery for a partial flap necrosis. Three patients (16%) required drainage by ultrasound of an intra-abdominal abscess, and three (16%) developed a fistula. No total flap failure was observed and no patients had developed a perineal hernia at three months. Other major events such as sepsis and ileus were rare. A total of 9 patients had died after a mean follow up of 20.1 months (3.0 to 54.2). The rest was sent a questionnaire of which 60% were returned (Table 3, 4) [9-15]. Most patients had a high colostomy impact score suggesting a high negative impact on QoL but only one reported that bowel or stoma function had major negative impact on QoL. Urological function was acceptable or good in all patients. One patient had a high rectal pain score equivalent to major pain syndrome but all patients reported that pain had minimal impact on their QoL. Most patients were not sexually active. The QoL was described as acceptable in one patient and good or very good in rest of the patients. Three out of four patients were based on the experience achieved satisfied and would recommend surgery to others.

Discussion

Advanced cancer in the pelvis with involvement of the ischioanal fat and the pelvic floor often results in extended surgical procedures to achieve radical resections. Preoperative irradiation and loss of tissue during the procedure calls for reconstruction to ensure optimal healing and good functional outcome [16,17].

Over a period of 9 years 19 patients were treated for pelvic cancer with IGAM flap reconstruction. Of these 10 were alive at the time of data collection.

At 3 months follow up the present study found that seven patients (37%) had experienced minor wound complications not requiring surgery of which 57% had complete healing within 3 months. Other recent studies that report wound infection and/or dehiscence in 9.4% to 17.5% [18-21]. Comparing wound complications is difficult as

Table 1: Patient characteristics.

Characteristics	N (%)
BMI	
<25	10(53)
25-<30	5(26)
30-<35	2(11)
>=35	2 (11)
Smoking	
Never	5(26)
Previous	12(63)
Current	2(11)
Alcohol	
Never	5(26)
<7units/week	6(32)
7-14units/week	6(32)
>14units/week	1(5)
Unknown	1(5)
Primary Disease	
Rectal cancer	12(63)
Anal cancer	7(37)
Type of Surgery	
Open	10(53)
Laparoscopic	5(26)
Robot assisted	4(21)
Reconstruction with Mesh	
Yes	9(47)
No	10(53)
Neoadjuvant Therapy	
Yes	15(79)
No	1(5)
Unknown	3(16)
ASA Score	
1	3(16)
2	11(58)
3	5(26)
WHO Performance Score	
0	10(53)
1	3(16)
2	5(26)
3	0(0)
4	1(5)

classification and treatment strategy may differ highly across hospitals and countries. A high risk of delayed wound healing is expected as most patients received neoadjuvant radiotherapy which has been showed to significantly increase the risk of wound complication [22]. A meta-analysis from Musters et al. [23] investigating wound healing after abdominoperineal resections without the use of flaps found that 15% of the patients had perineal wound problems increasing to 30% in case of neoadjuvant therapy.

Table 2: Complications at 3 months follow up.

Complications	N (%)
Minor wound complication	7 (37)
Intra abdominal abscess	3 (16)
Partial flap necrosis	1 (5)
Sepsis	2 (11)
Fistula	3 (16)
Pneumonia	1 (5)
Hydronephrosis	1 (5)
AFLI	3 (16)
Ileus	1 (5)
Hepatic encephalopathy	1 (5)
Clavien Dindo	
I	1 (5)
II	3 (16)
III a	1 (5)
III b	2 (11)
IV a	1 (5)
IV b	1 (5)

In the current study Perineal hernia was not found in any cases at 3 months follow up. Other reports found a perineal hernia in 0% to 5% of cases [7,18,19,21]. Balla et al. [24] showed that mean development time of perineal hernia after abdominoperineal excision was 13 months. At our institution a biological mesh is routinely used to prevent the development of perineal hernia. This might explain that we found no patients with perineal hernia in a relative short observation time. However, the use of mesh may contribute to the higher risk of fistula in the wound as we observed in this study, as we observed three patients (16%) that developed a fistula within 3 months. This is higher than other reports ranging from 0% to 2.5% [7,18].

No complete flap failure was seen in the present study which is similar to other studies reporting none or few failures [18-20,25]. Also, other major events such as cardiovascular failure, sepsis, and ileus were rare in the both the current study and other recent reports [18,21,25].

The patients were overall satisfied and the operation had limited impact on QoL due to pain, stoma, or urologic issues (Table 3). The patients reported a EQ-5D VAS score at level with the normal population [26]. It is a well know phenomena that after a life-threatening disease, such as cancer, the focus point in evaluation of QoL shifts. This means that QoL is evaluated to be relatively good despite major surgery or therapy [27,28].

A recent Swedish study investigated QoL and sexual function in 36 patients after surgery for pelvic cancer with perineal reconstruction using either VRAM or gluteus maximus myocutaneous flap [29]. All female and 75% of male patients reported sexual dysfunction. EQ-5D and QLQ C30 was used for investigating QoL and found an overall high QoL and low reporting of symptoms. In our small cohort only one patient was sexually active and reported very unacceptable sexual function. The remainder were either not sexually active or did not complete the questionnaire. We did not have information on whether the patients were sexually active prior to surgery. Regardless these

Table 3: Quality of life, questionnaires.

Patient number	Sex	Colostomy Impact Score	Bowel QoL	Urologic Satisfaction	Rectal Cancer Pain Score	Pain QoL	Sexual Function	Sexual Satisfaction
1	Female	19	A lot	Acceptable	No Significant pain	Not at all	NR	Acceptable
2	Female	7	somewhat	Acceptable	No Significant pain	Not at all	Not sexually active	NR
3	Female	10	NR	Very good	Minor Pain Syndrome	A little	Not sexually active	NR
4	Male	17	A little	Good	No Significant pain	A little	Not sexually active	NR
5	Male	5	Not at all	NR	No Significant pain	Not at all	5	very unacceptable
6	Male	10	A little	NR	Major Pain Syndrome	A little	Not sexually active	NR

N: Not Reported

Colostomy Impact Score: 0-9 Minor; 10-39 Major

Bowel QoL: How much does your bowel function affect your QoL: A lot, Somewhat, A little, Not at all

Urologic Satisfaction: Urologic function during past 4 weeks: Very good, Good, Acceptable, Unacceptable, Very Unacceptable

Rectal Cancer Pain Score: 0-7 No Significant; 8-17 Minor Pain Syndrome, >= Major Pain Syndrome

Pain QoL: How much have pain affected you in the past 4 weeks: Not at all, A little, Somewhat, Quite a lot, A lot

Table 4: EQ-5D questionnaire.

Patient	Mobility	Self care	Usual Activities	Pain/discomfort	Anxiety/Depression	EQ-5D Score	QoL satisfaction
1	Severe problems in walking about	Moderate problems washing or dressing my self	Severe problems doing my usual activities	Severe pain or discomfort	Moderately anxious or depressed	0.401	Acceptable
2	No problems in walking about	No problems washing or dressing my self	No problems doing my usual activities	No pain or discomfort	Slightly anxious or depressed	0.856	Good
3	No problems in walking about	No problems washing or dressing my self	Slight problems doing my usual activities	Slight pain or discomfort	Not anxious or depressed	0.802	Good
4	No problems in walking about	No problems washing or dressing my self	No problems doing my usual activities	No pain or discomfort	Not anxious or depressed	1	Very good
5	No problems in walking about	No problems washing or dressing my self	No problems doing my usual activities	No pain or discomfort	Not anxious or depressed	1	Good
6	No problems in walking about	No problems washing or dressing my self	No problems doing my usual activities	Slight pain or discomfort	Not anxious or depressed	0.859	Good

two studies might indicate that despite an overall good quality of life sexual dysfunction is an issue that needs attention after major pelvic surgery with reconstruction.

Conclusion

The present study on IGAM flap reconstruction for perineal defects showed no total flap necrosis and no perineal hernias were observed. Minor wound complications occurred in 37% and one major wound complication (partial flap necrosis) was seen. The QoL was acceptable with minor pains in half of the patients and no pains in the rest. The method had 75% satisfied patients who would be willing to undergo the same operation again. The IGAM flap is a robust and safe option to be used in selected cases.

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