



Gracilis Muscle and Myocutaneous Flap

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ABSTRACT

Gracilis muscle is type II muscle flap. Total 16 cases were operated on with Gracilis muscle or myocutaneous flap. Group A – loss of scrotal skin following Fournier's gangrene. Group B - Traumatic avulsion of the scrotal skin, Group C – Anal incontinence following Surgical repair of imperforate anus. Group D – Carcinoma penis operated for total amputation of the penis. Amputation of the penis. All the patients from Group A did well except for necrosis at the margin of the flaps in two patients. In Group B patient did well without any complication in Group C Three out of five patients did well. Two patients were still incontinent. In Group D, the first patient had a good flap for seven days. Later there was discolouration and on a ninth day, there was complete discolouration of the skin pedicle. Debridement was done, the muscle underneath was viable. A split-thickness skin graft was applied. The graft takes up was good. Within 10 days the muscle contracted too much an extent that the size of the phallus became almost nil.



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INTRODUCTION

Gracilis myocutaneous flap is not a new flap. This flap has been studied extensively as well as used for various reconstructions in the Perineal region like reconstructions of penis, scrotum, vagina, Ischial bedsores, anal incontinence, urinary incontinence and vesicovaginal fistulas.

Faecal continence is defined as the ability to perceive, to retain and to excrete rectal contents at the socially appropriate time.

A properly functioning anus is an unappreciated gift

of the greatest price. The continence of the bowel is maintained by –

1. Internal sphincter – This is the continuation and thickening of the inner circular layer of the bowel wall. This smooth muscle is capable of tenacity and probably is the most important factor in anorectic resistances.
2. Levator ani muscle, particularly the puborectalis component fibers form the puborectalis interlace with the deepest fibrous of the internal sphincter.
3. Intact Nervous Arc – consisting of sensory reception in the anal canal and the pelvic musculature the pelvic sympathetic and parasympathetic plexus and an intact CNS. Rectal filling produces relaxation of the internal anal sphincter via a local intramural pathway.
4. Perianal cutaneous sensation – It is rightly said that an incompetent anal sphincter is equivalent to an anal colostomy. At rest, some amount of high pressure exists in the anal canal approximately 4 cm in length, maintained mainly by the smooth muscle internal sphincter and to

a lesser extent by the skeletal muscle external sphincter.

The causes of anal incontinence can be –

1. Neurological
2. Trauma
3. Anorectic anomalies
4. Faecal impaction
5. Rectal prolapsed.

The external sphincter is absent in anorectal anomalies (malformation). Faecal incontinence is a challenging condition of diverse etiology and pathophysiology with devastating psychological impact.

“Gracilis sling” procedure is an excellent long term alternative for local faecal incontinence when time and other therapeutic measures fail.

In this study, we are presenting 16 cases where Gracilis myocutaneous or Gracilis muscle flap was used and their results.

The mental disorders occurrence is increasing and many severe adverse effects, addiction liabilities have been observed with chronic use of prescribed synthetic drugs. This led the way for the researchers towards natural tranquilizer sources.

MATERIALS AND METHODS

A total of 16 cases were operated as a muscle flap or a myocutaneous flap.

GROUP A - All the patients were admitted with the urology Department initially, where they received primary treatment in the form of debridement and dressings. Later on, they were referred for skin cover. One patient had associated urethral fistula, proximal to the corona involving the complete shaft of the penis. The urethra was reconstructed with a full-thickness graft from the groin and cover was provided with Gracilis myocutaneous flap.

GROUP B - This patient's clothing undergarments and scrotal skin were caught in the belt of a running wheel, following which he had total avulsion of scrotal as well as the penile skin. Split thickness graft was put over the penis and Gracilis myocutaneous flap was used for scrotal cover.

GROUP C - In this group, all the patients were operated on for imperforate anus with colostomy first and pull through later. All of them were incontinent. They all were psychologically upset as nobody was willing to sit with them in the class or play with

them. They were “social outcasts”. All these patients underwent a complete neurological checkup.

Per rectal examination was done in all patients. The sphincter tones were found to be very poor. Enema withholding was also poor. Various sophisticated tests like electrophysiological test and sphincter mapping are mentioned in the literature, and they were not done as they were not available. Preparation of the G. I. Tract with enemas and antibiotics was done routinely. Innervated Gracilis muscle was raised, tunnelled subcutaneously around the anal canal, tightened and sutured with 4 – 0 Prolene. At the same time, colostomy was done to prevent faecal contamination. Ten days after the surgery, all patients were put on physiotherapy and were asked to perform adduction exercises of the thigh. After three weeks, the colostomy was closed.

GROUP D - Two patient were operated for carcinoma of the penis with total amputation of the penis. Primary reconstruction of the penis was done with Gracilis myocutaneous flap. The urethra was reconstructed with a full-thickness skin graft taken from the groin.

Gracilis is a long thin muscle on the medial aspect of the thigh. It has taken origin from the pubic symphysis and inserts into the medial tibial condyle. This muscle has one proximal dominant and one or two distant minor pedicles (Type II). The dominant pedicle is the medial circumflex femoral artery that enters the muscle and its deep surface at a point approximately 8 – 10 cm below the pubic symphysis. Based on this pedicle, the muscle has one anterior and a posterior are of rotation. Anteriorly it will reach the groin and perineum and posterior it will reach the ischial and perirectal areas. The flap may be raised as a musculocutaneous unit with a skin island measuring upto 10x20 cm. The muscle is innervated by the obturator nerve and dealt with as an accessory adductor of the thigh. The muscle is dispensable. The key to safe elevation of this musculocutaneous flap is the accurate outlining of the skin island so that it is directly over the muscle. This is a thin muscle measuring 5 to 6 cm in width, and a skin island twice the width. A line is drawn from the pubic symphysis to the medial tibial condyle. The Gracilis muscle and its skin territory lie posterior to this line. A small incision is made 5 to 6 cm above and 2 cm Posterior to this line. Through this incision gracilis muscle tendon is identified. The tendon of the gracilis is found between the muscular fibres of the Because the gracilis is a type is a muscle with one dominant and one or two distal pedicles, the skin territory over the lower third of the muscle is not reliable.

RESULTS

GROUP A – All the patients did well except for necrosis at the margin of the flaps in two patients.

GROUP B - The patient did well without any complication.

GROUP C – Three out of five patients did well. Two patients . are still incontinent.

GROUP D – In this group, the first patient had a good flap till seven days. Later there was discolouration and on a ninth day, there was complete discolouration of the skin pedicle. Debridement was done, the muscle underneath was viable. A split-thickness skin graft was applied. The graft takes up was good. Within 10 days the muscle contracted too much an extent that the size of the phallus became almost nil. The second case did well.

DISCUSSION

Gracilis flap has proved most useful for reconstruction of vaginas, penis and anal sphincter, coverage of groin, perineum and per rectal region. The scrotum is a thermoregulatory, well-vascularised structure formed by skin and non – striated muscle with unique elastic properties.

In our series, there were nine cases with the loss of scrotal cover, eight cases because of post-infective pathology and one case because of traumas. It is essential to cover the denied testes primarily to avoid infection and thrombosis of the spermatic cord. In principle, of the testes have been totally denied or damaged, the technique of burying the testes in a thigh pocket, or covering them by skin flap is indicated. However, if the testes have their own tissue remaining, a skin graft is preferred. [Manchanda et al. \(1967\)](#) and [Balakrishnan \(1956\)](#) who has treated the largest number of cases with skin graft over the scrotum, found that spermatogenesis was normal in most of the cases. Seven cases of urinary incontinence treated by a free muscle transplant are reported. The incontinence was completely unaffected in 5. One patient was able to work without using diapers, while another albeit completely incontinent, could voluntarily stop the flow after the bladder was filled with water ([Medgyesi et al., 1979](#)). Possible sterility in some patients may be attributed to the primary damage of the spermatic vessels with subsequent atrophy of the testes. In such cases, the atrophy is invertible irrespective of the surgical method used to resurface the testes.

All patients (9 cases) had totally denuded testes so, and they were operated on using Gracilis myocutaneous flap. Burying the testes in a thigh pocket,

above the fascia, is a simpler and accepted procedure but it has certain disadvantages:

1. If the testes are buried deep in the thigh, the temperature being the same as the intra – abdominal temperature, spermatogenesis is hampered.
2. If the testes are not placed posterior, there will be stretching of the cord when the thighs are abducted.
3. In burying the testes, even minimal torsion should be avoided.
4. The chance of introducing infection in closed pockets may add to the collection, necrosis of the skin as well as testes.
5. Taking away the testes from their normal anatomical position make the patient nervous.

Considering the above disadvantages, 8 patients underwent Gracilis myocutaneous flap for scrotal cover. One patient was already operated on for implantation of testes in the thigh, but he demanded the testes to be brought in the normal position. One patient developed sterility. The other patient had normal sexual function as well as spermatogenesis. The scrotal sack can also be constructed with a fasciocutaneous flap from the medial aspect of the thigh.

The 'Gracilis sling' was described by [George et al. \(1993\)](#) worker For correction of anal incontinence and later, urinary incontinence in children. but, however, [Medgyesi and co-worker \(5\)](#)

Were unable to correct urinary incontinence in seven men. [Konsten et al. \(1992\)](#) after transposing gracilis sling, implanted electric stimulator advice in 12 patients. Anal manometry was done, which showed increased in mean pressure in both, without and with stimulation. With the stimulator, it was shown that there is an increase in Type – I relatively fatigue-resistant fibres capable of prolonged contraction from 44 % to 64% [George et al. \(1993\)](#). Dynamic gracioplasty is capable of replacing the function of a damaged or absent anal sphincter. Age, personal motivation and compliance with physiotherapy are essential for a good result. Gracioplasty was also used successfully after APR for the continent perineal colostomy ([Pieri et al., 1991](#); [Ma et al., 1989](#)). The operative procedure described by [Pickerel](#) was modified by keeping fascia on either side of the muscle to prevent it from overdistension. Success was measured in term of retention of

viscous fluid, increase in squeeze and resting pressure. Shanahan *et al.* (1993) (150) described the feasibility and the anatomical basis for the use of the long head of biceps- femoral with an electric stimulator.

In this study, we operated on five patients for anal sphincter reconstruction, out of which three patients did well. They could hold enema as well as faecal matter satisfactorily. We followed up on these patents for two years. There was a significant improvement in their psychological status and confidence. Two patients remained incontinent in spite of surgery. Probably tightening of the sling may help them.

McCraw *et al.* (1976) used the bilateral Gracilis flap for vaginal reconstruction. Orticochea (1972) described a case of unilateral Gracilis myocutaneous flap as a five-stage procedure for reconstruction of the penis. Macraw subsequently used this flap as a one-stage procedure and Douglas (1951) demonstrated the use of unilateral muscle covered with skin graft over a ventral penile defect in a young man with sickle cell disease. Hester and co-workers used bilateral Gracilis muscle with only skin graft for penile reconstruction. Reconstruction of the phallus was tried with a free radial artery forearm flap and rectus abdominals myocutaneous flap. Muscle atrophy in a myocutaneous flap would not lead to much shortening as simpler atrophy in the muscle with a skin graft. In this series, we operated on one patient for penile reconstruction and on the 8th day, skin peddle was lost. A split-thickness graft was put on the viable muscle underneath. As mentioned above, the grafted muscle became atrophic and the size of the phallus became too small.

CONCLUSION

The external sphincter is absent in ano-rectal anomalies (malformation). Faecal incontinence is a challenging condition of diverse etiology and pathophysiology with devastating psychological impact. "Gracilis sling" procedure is an excellent long term alternative for local faecal incontinence. Gracilis flap has proved most useful for reconstruction of vaginas, penis and anal sphincter, coverage of groin, perineum and per rectal region.

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Conflict of Interest

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