



## Management of Degloving Penoscrotal Injury with Anteromedial Testicular Thigh Pouch and Skin Graft

Authors

Shanky Singh<sup>1</sup>, Priyabrata Das<sup>1</sup>, Vaibhav Vikas<sup>1</sup>, Jatin Soni<sup>1</sup>

<sup>1</sup>Department of Urology, Government Medical College, Trivandrum, India

Corresponding Author

Priyabrata Das

C/O Baby Peter, Nirmal T.C. VI/2009, Medical College PO –Prasanth Nagar, Trivandrum-695011

### Abstract

**Background:** *Degloving penoscrotal injuries are uncommon events. Accidents with agricultural machine belts or industrial machines are its leading cause. Management of degloving injury can be either single stage or staged procedures depending on the severity. We report our experience in management of degloving penoscrotal injury with anteromedial testicular thigh pouch and skin graft.*

**Materials and Methods:** *In between July 2014 and June 2017, seven male patients presented to us with degloving penoscrotal injury and their data were recorded. Investigations included blood examinations, wound swab culture and sensitivity, ultrasonography and retrograde urethrogram. All were managed with anteromedial thigh testis burial and skin graft over the penile shaft. Treatment outcome was assessed in terms of cosmesis, voiding function, quality of life, and complications.*

**Results:** *At a mean follow-up of 25 months all had good quality of life. Their median age was 29.29 yrs (range 20-40 yrs). Industrial and agricultural machine injury was cause of degloving penoscrotal injury in 3 patients each and dog bite was seen in 1 patient. Anteromedial testicular thigh pouch and skin graft was performed in all patients. All complications were transient and managed conservatively. Normal voiding function and erection of penis were seen in all patients with satisfactory cosmetic result.*

**Conclusion:** *Anteromedial testicular thigh pouch with skin graft, as a single stage procedure is a good surgical option in the management of degloving penoscrotal injury.*

**Keywords:** *Degloving; Penoscrotal; Testicular; Thigh Pouch; Skin Graft.*

### Introduction

Penoscrotal injuries can be caused by degloving or penetrating injuries. In degloving injury there is minor contact with object which hooks and physically rips off the skin leading to extensive superficial injury but sparing testes, corpus cavernosum, bulbous spongiosum and urethra. Harvesting machines in agriculture field and industrial machines such as pulleys, chains and

rotary discs are the leading causes of degloving injuries. They are generally free of infection and not life-threatening but requires special attention as they are incapacitating and have a devastating psychological impact on patients.<sup>1</sup> The management of degloving injury involves hemorrhage control, minimal debridement, and early repair. The management differs according to the site and extent of injury. Immediately after

trauma, primary closure of wound is possible with the remaining surrounding tissue if the scrotal skin loss is less than 50 percent.<sup>2</sup> If there is extensive scrotal wounds with exposed testes, it is of paramount importance for physiological, social and psychological reasons, especially in young males to restore the durable functional cover of the testes and shape of scrotum.<sup>3</sup>

Management of major penoscrotal wounds is difficult. Burying of testicles under the thigh skin<sup>4</sup>, expansion of the remaining scrotal and adjacent skin<sup>5</sup>, simple skin grafting<sup>6,7</sup> and various types of flaps like deep inferior epigastric<sup>2,8</sup>, omental pedicle flap<sup>9</sup> and rectus abdominis muscle flap<sup>10</sup> are some of the surgical options for closure. Thighs can also be a good donor site for many flaps like; gracilis muscle and myocutaneous flap<sup>11,12</sup>, anterolateral thigh fasciocutaneous island flap<sup>13</sup>, unilateral adductor minimus myocutaneous flap<sup>14</sup>, anteromedial thigh flap<sup>15</sup>, superomedial thigh flaps.<sup>16</sup>

### **Aim and objectives**

To evaluate the efficacy of anteromedial testicular thigh pouch with skin graft, as a single stage procedure in the management of degloving penoscrotal injury.

### **Materials & Methods**

**Study sample:** Between July 2014 and June 2017, seven patients with a mean age of 29.29 years (range 20 to 40) who had a degloving penoscrotal injury was treated at our institution with anteromedial testicular thigh pouch with skin graft.

#### **Inclusion criteria**

All cases of degloving penoscrotal injury

#### **Exclusion criteria**

1. Penetrating penoscrotal injury.
2. Fournier's gangrene
3. A follow-up of <12 months

Patients demographical, clinical history, diagnostic and procedural data were recorded. At emergency department patients haemo-dynamic stability was first evaluated followed by assesment of degloving penoscrotal injury.

Blood investigations, urine analysis, complete blood count, coagulation profile and renal function tests was routinely send in all patients . Swab was taken for culture and sensitivity and patients were subjected to regular dressing and continued on injectable cefoperazone until wound was clean, healthy with no growth on culture. Imaging studies included ultrasonography( USG ) with colour doppler and retrograde urethrogram.

Initial management of patients included tetanus toxoid,analgesia, intravenous fluids, light dressing and intravenous antibiotics. Careful debridement and removal of dirt was done under general anaesthesia, which allow assessment of the extent of penile damage and confirms the viability of the testicles.

Full written informed consent was obtained from each patient after explanation of all the available techniques for degloving injury and risk of anteromedial testicular thigh pouch with skin graft.

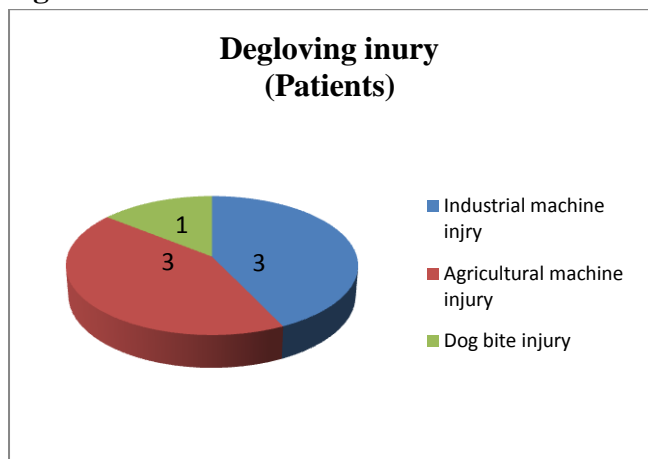
### **Surgical technique**

Under spinal anaesthesia patient was placed in supine position. Initially the anteromedial region of thigh pouches was created subcutaneously and respective testicle burial was done with ease without rotation in there axis. Later, the penile shaft was slightly scooped and first covered with remnant scrotal and prepuce skin. After that , the split skin graft was harvested from thigh and kept over the penile shaft. Five days later the dressing changed and penile graft viability was assessed. The testicles in the antero medial thigh appears was examined after surgery with USG and color doppler scan for the vascularity.

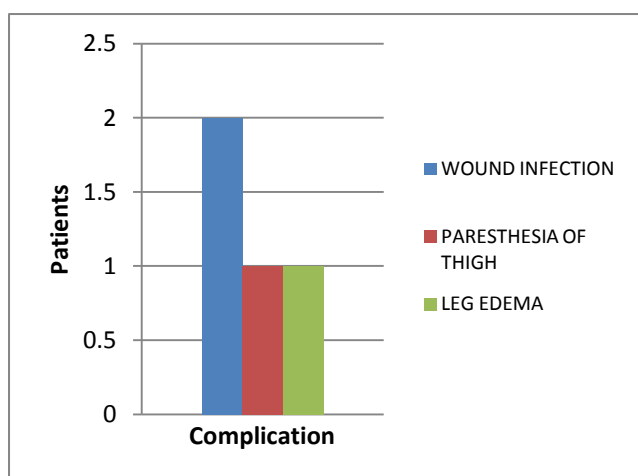
### **Results**

Degloving injury of penile and scrotal area was noted in 7 male patients during our study period. Their median age at surgery was 29.29 yrs (range 20-40 yrs). Industrial and agricultural machine injury was cause of degloving penoscrotal injury in 3 patients each and dog bite was seen in 1 patient (Figure 1).

Figure 1.



Whereas degloving injury of scrotum was demonstrated in 5 patients on the bilateral side, only 2 had a right side involvement. Out of 5 patients having bilateral scrotal involvement only 2 patients had industrial machine injury, while agricultural machine injury was cause of degloving injury in remaining 3 patients. Dog bite caused degloving injury of right penoscrotal region in 1 patient. All patients had good vascularity in colour Doppler scan. Retrograde urethrogram was normal in all cases. Anteromedial testicular thigh pouch and skin graft was performed in all patients. Out of 7 patients 5 had bilateral testicular pouch and 2 had only right testicular thigh pouch creation. Complications of surgery included mild wound infection in 2 patients, transient paresthesia over anterior part of thigh in 1 patient and moderate swelling of both legs in 1 patient. All complications were transient and managed conservatively.



Normal voiding function and erection of penis were seen in all patients with satisfactory cosmetic result. All patients had psychiatric consultation regarding the post traumatic mental status after 3 months. Psychiatric results showed that all were happy with outcome of procedure, size of penile erection and position of testis in thigh. At a mean follow-up of 25 months all had good quality of life (Table 1).

Table 1.

Sr.No	Age (Years)	Injury	Scrotal Wound	Thigh Pouch	Complications
1	20	Industrial Machine	Bilateral	Bilateral	None
2	28	Agricultural Machine	Bilateral	Bilateral	Wound Infection
3	29	Industrial Machine	Bilateral	Bilateral	Bilateral Leg Edema
4	35	Industrial Machine	Right	Right	Paresthesia Over Thigh
5	32	Agricultural Machine	Bilateral	Bilateral	None
6	21	Dog Bite	Right	Right	Wound Infection
7	40	Agricultural Machine	Bilateral	Bilateral	None

Discussion

Penoscrotal injury can be due to infection, burns, human or animal bites, and degloving injuries that involve farm and industry machinery. Superficial injuries are common in this area causing minimal bleeding without producing damage to the cavernous body, the spongy body or the testes.<sup>1</sup> Involvement of corpora are rare. Simple laceration to virtual emasculations are consequences of such injuries.<sup>17</sup> Patient management of such cases aim to achieve a satisfactory aesthetic result, normal voiding and re-established sexual function and henceforth, requires careful selection of which tissue to debride, as well as proper selection of grafts and flaps for reconstruction. Degloving injuries are common in penoscrotal area due to their susceptibility to avulsion injuries. Penile skin gets easily ripped off during avulsion injury as they are loose and elastic. In both rigid and flaccid state penile skin is highly mobile and this predisposes the skin to come out easily from the penis.<sup>17</sup> During degloving injury corpora along with urethra are spared as there is a natural cleavage plane along the shaft of the penis

between the Buck's fascia surrounding them and the loose areolar tissue of the skin. The avulsed segment of the skin from the penis includes the loose areolar tissue with its subcutaneous veins, the dartos fascia, and the skin as a unit. Vascularity of the denuded penis could be significantly comprised along with the high risk of secondary infection skin. To prevent such complications, surgical repair of degloved penis should be done quickly. It is difficult to repair scrotal skin avulsion as the skin of the scrotum is extremely loose, and the deeper layers contain the dartos, which is a thin layer of smooth muscle fibers. The cremasteric fascia and muscle, which are important for thermoregulation of the testicles to maintain adequate spermatogenesis, lies below dartos along with intercolumnar fascia.<sup>18</sup> So testicles should be replaced as close to their original location as possible. Cremastic reflux according to some authors protect testes in degloving injury because testicles are usually spared in it.<sup>18</sup>

Management of degloving penoscrotal injury can be single stage or multiple stage procedure. Initial cleaning and debridement of devitalised tissues are required in both. The coverage of exposed testes and replacement of penile skin loss is especially important and a wide variety of reconstructive procedures have been described for it. It depend on patient's general condition, the severity of the injury, and the local anatomic conditions (e.g., the extent of tissue defect, and viability of adjacent skin).<sup>19</sup> Balakrishnan C established first time a two stage procedure with skin graft for coverage of exposed testes.<sup>6</sup> Healthy granulation tissue and intact tunica vaginalis are its main requirement.<sup>1</sup> Good cosmetic results can be obtained by this procedure but patient are usually not satisfied with this procedure due to contractions, less mobility and poor protection of the underlying testicles.<sup>1,13</sup> All our patients had skin grafts for coverage of exposed parts of penile shaft and it gave an acceptable results.

Degloving penoscrotal injury treatment can also be possible with single stage anteromedial testicular thigh pouch and skin graft. Testes was

mobilized by Wolach et al to medial thigh pouches in 40% of his patients.<sup>20</sup> Success rate of 96% was achieved by this medial placement of the bare testes into the subcutaneous pouch of the thigh.<sup>2</sup> It requires less surgical skill with less morbidity. Disadvantage of this procedure include unsuitable environment for testicular function with possible atrophy, feminine appearance, pain, tension, and fullness sensations.<sup>21</sup> Advantage of thigh pouch is that it can be used as a single stage procedure with good quality of life postoperative, as shown in our study. Normal voiding and erection of penis with good aesthetic results are possible with this procedure. It may also be a beneficial as a temporary stage procedure for preservation of the testes and preparation for full scrotal reconstruction.<sup>22</sup>

Most of these limitations of thigh pouch can be solved by scrotal reconstruction with bilateral superomedial thigh flaps. A better functional outcome can be obtained by staged reconstruction. It gives more reliable coverage and sensate and hair-bearing scrotum. Also problems of graft take and graft contracture which may cause painful erection are less with staged reconstruction. Sometime because of long duration of procedure, like that described by Luiz et al.<sup>23</sup> which extend to 7 months, there can be a negative emotional impact on the patient. The aim of degloving injury management is to minimize such effect without jeopardizing the satisfactory outcome.

Penile burial in the scrotum or in the suprapubic region is performed when no skin is available for coverage. Still and Goodman<sup>24</sup> described techniques like banking of the testicles in the inner thighs or reconstruction of the scrotum by tissue expansion are also applicable. A better scrotal contour and less curvature may be obtained with the combination of the flap and split skin graft as described by Sengathir.<sup>2</sup> Management of each patient is individualised, as the mechanism of injury is quite varied. Degloving penoscrotal injury was managed by us with skin grafting and inner thigh burial and it provided satisfactory results. It requires no special facilities at district hospitals and save the valuable time and avoid

infection and can be performed by general surgeon also. Multidisciplinary approach, with urology and plastic teams plays an important role in degloving injury, as shown by Michael Ward<sup>25</sup>, but in remote areas where patients are not affordable for specialised treatment a simple single staged reconstruction by thigh pouch might be a suitable solution.

#### Conclusion

The main modality of treatment of degloving penoscrotal injury is staged reconstruction or flaps with skin graft. A simple single staged reconstruction by anteromedial testicular thigh pouch and skin graft can be considered a suitable option for degloving penoscrotal injury with a good result and psychological benefit. Moreover it can be done by general surgeons at any district hospital or general hospital away from optimal setting.

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