

Role of Ultraosonography in Grading of Penile Fractures

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ABSTRACT

Introduction: Penile fracture is an uncommon and less reported condition. Early diagnosis with corrective measures is the order of the day.

Aim: To perform ultrasonography of penis and to understand its role in making correct diagnosis of fractures. To know how it will help surgeon in its management and in adopting a grading system.

Materials and Methods: Emergency evaluation of 15 cases of penile fractures by ultrasonography before surgery. Entire penis was

scanned all along its length and circumference. Tunica albugenia was seen as white covering of both corpora cavernosa and break in its continuity is seen as wedge shape defect. Hematoma on either sides of tunica was well appreciated.

Results: After ultrasonography all patients underwent emergency surgery, the defect in corpora was well appreciated. Repair of tunica albugenia was done which confirmed our findings.

Conclusion: Ultrasonography is the modality of choice for quick diagnosis, and no other radiological workup is required before surgery.

Keywords: Corpora cavernosa, Corpora spongiosa, Tunica albugenia

INTRODUCTION

Penile fracture is not a common condition and to a majority of physicians it is unheard. It presents as an emergency situation as majority of patients present in late night due to typical cause which is related with sexual activity. It demands quick and correct decision making in order to both diagnose and to do surgery to avoid complications. We are highlighting the true fact that ultrasonography (USG) is the modality of choice in diagnosing it and giving a road map to surgeons to repair. We are sharing our experience of 15 cases.

USG plays a crucial role in analyzing penis, it is most common radiological investigation ordered due to its diagnostic value in penile fracture. It is of immense value to help surgeon to perform and avoid non surgical complications [1-3].

Purpose of our study was to do USG and after operation discuss with surgeon about our findings and to grade it. Penile fracture grading by USG is first time done and it has helped in surgical repair.

MATERIALS AND METHODS

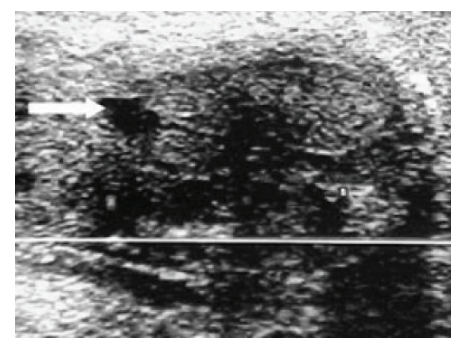
In last five years between 2010-2014 we have seen 15 cases between 20-52 years of age, all came during odd hours as an emergency. The study was conducted after acquiring institutional board approval and informed consent from all patients. Patients with eggplant deformity after sexual act were included in the study.

Patients having erectile dysfunction (ED), any injury to penis or any congenital lesion like hypo or epispadias were excluded from the study.

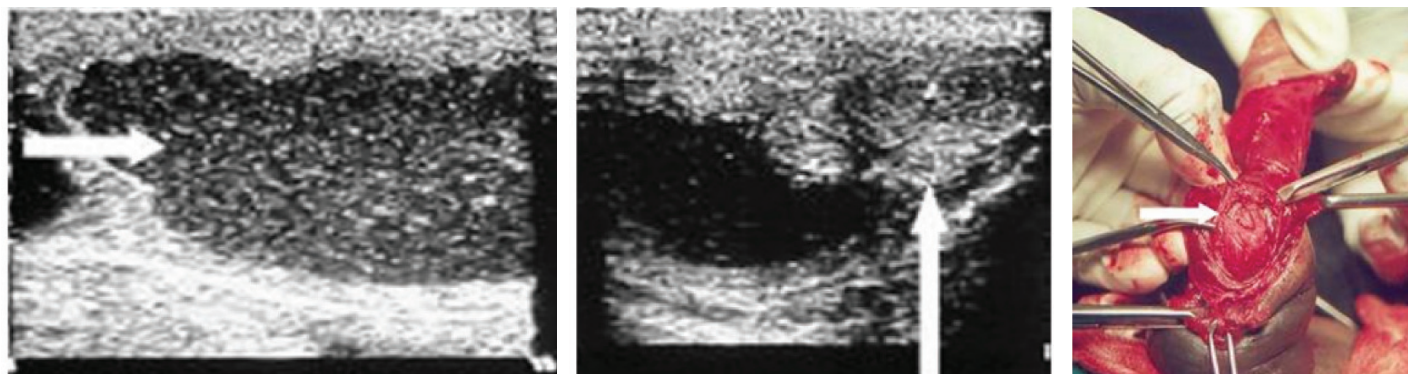
Almost all patients had history of injury during sexual act except one who had manipulated his organ during the erection. Clinical symptoms and signs are classical, they present as cracking sound followed by pain, detumescence, "Eggplant Sign" deformity, deviation to one side and hematoma [Table/Fig-1]. This is a prospective study done by team of three surgeons and three sonologists. This study was done in Kempegowda Institute of Medical Sciences.

In all patients USG was done by 7.50 to 12 MHz linear probe. The probe first transversely from the base of the penis to tip on the dorsal aspect. Then it was put in longitudinal position to view the penis in entire length. Then we gently turned penis to lie on lower abdomen to see ventral aspect. Once again transverse and longitudinal scanning was done from base to tip on ventral aspect [4-6]. Two corpora cavernosa, one corpora spongiosa, tunica albugenia and vessels like superficial and deep dorsal veins, dorsal artery and cavernosal arteries were identified. Doppler was used to identify vascular pattern or to see any abnormal vascularity or malformations.

We adopted a grading system based on our experience of penile fracture by USG [Table/Fig-2].



[Table/Fig-1]: Picture of classical "Eggplant" shape of penis after fracture [Table/Fig-2]: Diagrammatic representation of penile fracture grading [Table/Fig-3]: Ultrasonography showing wedge shaped defect in corpora cavernosa (Arrow). It is grade I injury



[Table/Fig-4]: Ultrasonography showing corpora cavernosa injury and peri albugenial and pericavernosal hematoma (Arrows) it is grade II injury

[Table/Fig-5]: Ultrasonography showing pericavernosal hematoma and deep fascia hematoma (Arrows). It is grade III injury

[Table/Fig-6]: Picture of penis during surgery grade I fracture tunica albugenia (Arrow)

Grade 0 - Normal tunica albugenia seen as white echogenic covering of both corpora cavernosae without defect.

Grade I - A defect in tunica albugenia seen as a wedge shape with peripheral broad base showing discontinuity in echogenic covering along with involvement of corpora cavernosa [Table/Fig-3].

Grade II – Hematoma, seen as mixed echogenic illdefined area on either sides of albugenia i.e.in corpora cavernosa and subcutaneously [Table/Fig-4].

Grade III - Hematoma of deep fascia along with corpora spongiosa involvement suggesting more severe injury [Table/Fig-5].

Grade IV - Injury with involvement of corpora spongiosa, urethra and vascular injury with any vascular malformation.

Grade IV injury was seen in one patient only as he has manipulated his penis with intention of hurting. In this many areas of tunica defects, cavernosal tears and also involvement of spongiosa along with urethral injury was seen. The urethral injury was not severe however it was easily located by retrograde urethrography (RGU).

All our patients underwent surgical repair using various established techniques [7-9]. Our USG findings were very useful to surgeon in locating the fracture site and repairing [Table/Fig-6]. The grading system surely will be of significant help to sonologist and also to surgeon as these cases of penile fractures are on a rise

RESULTS

The cases of penile fractures it seems are underreported. Duration of their presentation was 4 h to 2 days. All patients had more or less same clinical presentation except one who had hematuria and two had retention of urine. The cause of the present symptoms was same however two patients initially did not reveal sexual cause.

As per our grading 6 patients were in grade I, 5 in grade II, 3 in grade III and 1 was in grade IV. We were able to see the injury in all cases. The tear in corpora cavernosa is clearly seen as discontinuity in white echoes of this layer and a wedge shaped hypoechoic area in cavernosa with peripheral broad base at the area of tunica [Table/Fig-3]. We were able to see intra cavernosal hematoma. The rupture of buck's fascia was seen in six patients. These patients were put on indwelling catheter for two weeks. The size of fracture defect did vary from person to person. There was no herniation of any other tissue seen along with the defect. Duration of hospital stay was between 2 to 4 days after surgery [Table/Fig-7].

After 8-12 wk all of them were able to be sexually active as before. Angulations of penis persisted in one patient. We lost one patient due to generalized septicemia; one had wound infection and one patient developed suture granuloma which was treated. All patients were managed surgically by sub-coronal incision and repair by prolon 3/0, synthetic non-absorbable sutures. Inverted sutures were put for better healing. Once surgical repair was done we became very confident in going ahead with our goal of USG grading of penile fractures.

Grade 0	Normal tunica albugenia.
Grade I	Defect in tunica albugenia. Defect in corpora cavernosa.
Grade II	Perialbugenial & Cavernosal hematoma.
Grade III	Hematoma of Deep Fascia. Involvement of Corpora spongiosa.
Grade IV	Urethral injury. Vascular malformation.

[Table/Fig-7]: Grading criteria of penile fractures

Pt. No	Grading	USG Findings	On surgery USG findings confirmed	Recovery	Other Tests.
1	I	+	+	Total	No
2	I	+	+	Total	No
3	II	+	+	Angulation	No
4	III	+	+	Wound infection	RGU
5	III	+	+	Suture Granuloma	No
6	I	+	+	Total	No
7	II	+	+	Total	No
8	I	+	+	Total	No
9	I	+	+	Total	No
10	III	+	+	Total	No
11	II	+	+	Total	No
12	IV	+	+	Septicaemia	RGU
13	II	+	+	Total	No
14	I	+	+	Total	No
15	II	+	+	Total	No

[Table/Fig-8]: Ultrasonographic and surgical findings of all the patients

DISCUSSION

The penis is covered by skin, foreskin (prepuce) & stratified squamous mucosa. The penis consists of three masses of erectile tissue - two corpora cavernosae one on each side dorsally and one corpora spongiosa ventrally through which urethra passes. All three are covered separately by white fascia known as tunica albugenia. The expanded free end of corpora spongiosa is called glans. Common penile diseases are congenital, infections, carcinoma and erectile dysfunction (ED). We are regularly using doppler ultrasound for analyzing vascular causes of ED.

Fracture of penis is in fact not heard by medical fraternity leave aside even seeing. Here the "tunica" = covering & "albugenia" = which is white in colour is breached. This white fascia tunica albugenia is 2 mm thick, becomes up to .25mm thin due to erect penis which is due to increased intra cavernosal pressure. This is about 1500 mm Hg almost 10-12 times of normal due to rush of blood in cavernosal sinusoidal spaces. Both corpora cavernosae

are divided by fenestrated septum which has anastomotic channels. At erection increase in parasympathetic motor activity occurs. It leads to arterial and sinusoidal wall relaxation which in turn dilates cavernosal spaces and enlarges both corporae. As the penis get erect, hard and rigid it becomes vulnerable to get fractured [2,10-12].

The ultrasound findings were described for penile fractures by many workers but we found that USG was useful in its grading so that a surgical workup can be planned. Quick and accurate decision making is the key to the safe management and successful outcome in patients with penile fracture [13,14]. To identify and interpret grading system was done with ease by USG. There is no need to do delay in management or to ask for any other imaging modality for further evaluation [1,12].

It is simple and easy to identify tunica albugenia as bright echogenic line and to see its discontinuity, or to see any hematoma on either sides of tunica is also easily made out. It has been seen that the information we got from USG was more or less similar to other investigators [1,10,11,15]. There are however few instances when other observers did not find utility of USG [16].

Our USG grading and surgical outcomes were in tandem. So, it can be concluded from the study that penile fracture should be graded before any surgery [Table/Fig-8]. All the patients had good healing, better functional results and aesthetics. We did not face any post operative complications of penile shape or functioning in spite of emergency surgery [7,12,13]. However, many complications have been reported, like shaft curvature, corporal narrowing, urethral stricture and impotence mainly due to spongiosocavernosal fistula. We did not delay surgical interventions unlike other researchers who delayed for 10-12 days in a series due to swelling of entire penis and non availability of USG [17]. However, in the present study, timely intervention was done as soon as USG findings were attained.

CONCLUSION

USG is the investigation of choice; it is cost effective, non invasive and quick method to delineate penile fractures. This will open new avenues for others to avoid misdiagnosis and delay in treatment; otherwise it will lead to penile disfigurement.

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