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Original Research Article

Surgical management of bull horn injury

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ABSTRACT

Background: Bull horn injuries are very frequent, especially in areas with a strong bullfighting tradition professional or amateur all over the world though it is uncommon in India.
Methods: A retrospective study of patients admitted to department of general surgery in IGGMC, Nagpur which is tertiary care hospital in central India with the diagnosis of wound by bull horn, between January 2002 and March 2016 was done. Sixty seven patients with bull horn injury were included prospectively.
Results: The vast majority of patients were male (80%), with only 13 women (20%). Male: Female ratio was 4:1. The mean age was 34 years for men and 28 years for women. The commonest site of injury was in the abdomen followed by the perineum, back and lower limb. The repair includes, 3 mesentric tear , 2 ileal perforation primary closure, 1 liver suture, 1 splenectomy, 1 gastric perforation primary closure, 1 bladder rupture primary closure, 1 primary closure of sigmoid perforation with proximal colostomy,1 primary repair of anorectal tear with functioning colostomy and 1 femoral vein repair. Perineal wound treated by primary repair and a de-functioning colostomy. The patient with partial avulsion of the scrotum was treated by a secondary closure. The average hospital stay was 7.9 days. Overall wound infection rate was 12.9%.
Conclusions: In rural India, bull is very useful animal for domestic and farming purpose. Early surgical treatment is required to prevent further morbidity and mortality.

Keywords: Bull horn wound, Colostomy, Laparotomy, Sheathed goring

INTRODUCTION

In rural India, bull is very useful animal for domestic and farming purpose. This domestic animal has caused some shockingly dangerous injuries by accidental bull horn injury. Bullfighting is very popular throughout Spain though it is not seen in India, but occasional reports are there about bull horn injuries.

Bullfighting is very popular throughout Spain in virtually every city and in most tows during the local "fiestas" and "corridas". Many towns also stage "encierros" (bull dodging), where bulls and wild cows are let loose in the streets to chase enthusiasts, who display their skills at dodging them. In addition to the world-famous encierros of the San Fermin festivities, the region of Navarra features a myriad of bull events in every town, with wild cows being used more commonly in small towns.[4,7]

Bull horn lesions are frequent in the Latin world due to the existence of spectacles involving these animals. These wounds have special features that make them different from all other lesions. There is a special type of bull horn wound called sheathed goring. In this type of lesion, the skin returns to its normal appearance after the goring, but the injury is done.[1] We describe a child who presents with

generalized abdominal pain and vomiting as the initial symptom caused by bull horn injury in our emergency surgical department.

METHODS

A retrospective study of patients admitted to department of general surgery in IGGMC, Nagpur which is tertiary care hospital in central India with the diagnosis of wound by bull horn, between January 2002 and March 2016 was done. Those patients were excluded from this study in which no wounds occurred other than impact of bull horn (bruising, crushing, bone fracture, etc. Among the data collected included: patient name, medical record number, age, sex, marital status, origin, date of admission, discharge date, location of the main wound, presence of visceral disease, type of surgery, type anesthesia, use of drains, antibiotics, tetanus vaccination, presence of fever during admission, need for blood transfusions, need for surgery, days of hospitalization in intensive care unit (ICU), immediate complications (during admission) or late (after hospital) and reoperations.

Case report

A 14 year unmarried male patient presented with penetrating wound over anterior abdominal wall in our emergency surgical department, who was referred from private hospital. Patient complaint of pain in abdomen since 4 days, there was history of vomiting, only once on 2nd day of bull horn injury. Physical examination was revealed generalized tenderness over abdomen along with distension of abdomen. His haemoglobin was 7.8 gms, and blood group was O Rh positive. We first did x- ray abdomen standing which was normal, we did ultrasound abdomen and it was suggestive of moderate pyoperitoneum, and because of our strong clinical suspicion of bowel injury we repeated his x-ray abdomen standing after pushing 200 cc air through nasogastric tube, it showed gas under diaphragm, confirming our diagnosis of bowel injury due to bull horn injury. Exploratory laparotomy was done and intraoperative finding was suggestive of 7 mm entry wound over the one side of terminal ileum and exit wound (1 cm) on another side, 10 cm away from ileocaecal junction. Evidence of 1 cm wound over posterior peritoneum near left common iliac vessels. Considering the edema over perforation and unhealthy edges, resection of ileal segment and ileoascending anastomosis with closure of peritoneal wound was done Figure. The postoperative period was uneventful.

RESULTS

Sixty seven patients with bull horn injury were admitted to our surgery unit during the l2 years period 2002 to 2016. The sex and age distribution is indicated in Table 1.

All these patients were directly referred by the primary health centre and secondary health centre from the rural area. The vast majority of patients were male (80%), with only 13 women (20%). Male:female ratio was 4:1. The mean age was 34 years for men and 28 years for women, age ranges from 2 to 98 years.

Table 1: Age and sex distribution.

Age (years)	Male	Female
<10	1	0
11 - 20	4	1
21 - 30	11	7
31 - 40	24	5
41 - 50	8	0
51 - 60	1	0
61 - 70	3	0
71 - 80	1	0
81 - 90	0	0
>91	1	0
Total	54	13

Sixteen patients were accidentally injured whilst feeding the animal or passing carelessly near to it, whereas 51 patients were deliberately attacked by the bull. Most of the wounds were lacerations measuring from 1.5 to 20 cm in length as shown in (Table 2). The commonest site of injury was the abdomen (36 cases), followed by the perineum, back and lower limb (8 cases each), chest, upper limb (3 cases each) and head and neck in that order. In the case of abdominal injuries, the lower part was most commonly affected, particularly the right iliac fossa. Some patients presented with separate wounds of entry and exit caused by the horns passing tangentially through the layers of the abdominal wall. The peritoneum was breached in 29 cases, allowing prolapse of bowel or omentum. Out of 8 perineal injuries, 6 were lacerated wounds of the skin with or without injury to the anal canal, one had lacerations of the posterior vaginal wall and one male patient had partial avulsion of the scrotal skin leaving the testicles bare.

The average hospital stay was 7.9 days, with minimum and maximum values of 1 and 21 days respectively. Organs affected include sigmoid colon, small intestine, liver, spleen, stomach, bladder and vascular injuries occurred in 1 case. The number of laparotomy was 25, and intra-abdominal visceral affection was demonstrated in 12 patients.

The repairs consisted of visceral

3 mesentric tear repair, 2 ileal perforation primary closure, 1 liver suture, 1 splenectomy, 1 gastric perforation primary closure, 1 bladder rupture primary closure, 1 primary closure of sigmoid perforation with proximal colostomies, 1 primary repair of anorectal tear with functioning colostomy and 1 femoral vein ligation internally. Perineal wounds involving the anal canal were allowed to heal by granulation tissue, the posterior vaginal wounds were repaired, and patient with an

anorectal tear was treated by primary repair and a de-functioning colostomy. The patient with partial avulsion of the scrotum was treated by a secondary closure.

Surgical treatment, and repair for extremity wound, was followed in by washing with plenty of saline and hydrogen peroxide, with debridement of all devitalized tissue. Repair with monofilament non absorbable 2/0 or 3/0 sutures could be done with local anesthesia. All patients had complete tetanus immunization and broad-spectrum antibiotics covering aerobic (gram positive and gram negative) and anaerobic bacteria were given. The combination most commonly used antibiotic was metronidazole + amoxicillin and clavulanic acid.

Table 2: Location and management of injury.

Location of injury	No. of cases	Exploration (no. of cases)	Visceral injury	Management
Head and neck	1	-	-	Primary suturing
Chest	3	-	-	Primary suturing
Upper limb	3	-	-	Primary suturing
Abdomen Rt. hypo	(36) 1	1	Liver laceration (1)	Laprotomy and repair
Epigastrium	2	2	Gastric perforation (1)	Primary closure splenectomy
Lt. hypo	2	0	Spleenic injury (1)	-
Rt. Lumbar	1	1	-	-
Umbilical	5	0	-	-
Lt. Lumbar	1	11	Mesenteric tear (3)	Primary repair
Rif	15	-	Ileal perforation (2)	Primary closure
Hypogastrium	5	3	Bladder rupture (1)	Primary closure
Lif	4	2	Sigmoid perforation (1)	Primary closure with de-functioning colostomy
Perineum	8	2	-	Primary repair and a de-functioning colostomy
Lower limb	8	1	-	Vascular repair
Back	8		-	

The patients were mostly agricultural workers and it was virtually impossible to organize any long term follow up. The only other important complication of bull horn injury was wound infection of varying severity. Overall wound infection rate was 12.9%. Primarily and secondarily closed wound were having 45.6% and 6.8% wound infection respectively. One patient died from shock shortly after vascular repair.

Bull horn injury over abdomen

Figure 1: Bull horn over abdomen.

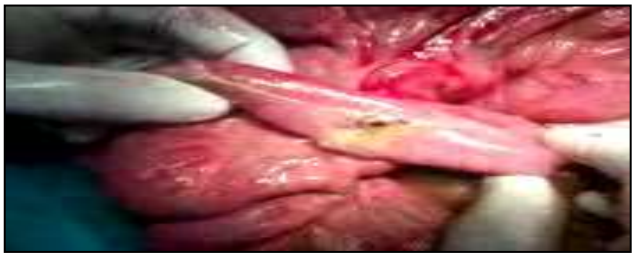

Figure 2: Entry wound.

Figure 3: Exit wound.

Figure 4: Posterior peritoneal rent.

Figure 5: Indian bull.

Fever was observed (>38 °C) in 24 patients and 18 cases required the transfusion of red blood cell concentrates. The most frequent immediate complication was wound infection in 27 patients, and the most frequent late complication was incisional hernia, with 2 cases, which required surgical repair scheduled on all occasions. Mortality was in 1 patient as a result of haemorrhagic shock post laprotomy.

DISCUSSION

Bull horn injuries are very frequent, especially in areas with a strong bullfighting tradition - professional or amateur all over the world. Wounds caused by bull horns present their own characteristics that make them different from any other type of injuries: presence of large tissue damage, different paths of injuries, cavities, twists and turns and culs-de-sac as well as massive inoculation of aerobic and anaerobic germs and the possibility of transmitting tetanus.

Bull horn wounds classified in four types

- Sideways thrust - where the horn thrusts the body tangentially causing only contusions
- Jab - where the injury is caused by the tip of the horn
- Misleading wound -where there is an orifice of entrance that is far from the core injury and where associated lesions can coexist
- Goring - which is a deep wound that affects fascia and muscle.

Sheathed goring's is also known as "goring on healthy" and it occurs when the bull horn penetrates the body but, due to the elastic capacity of the skin, there is no solution of continuity and the skin returns to its previous appearance or shows mild alteration (ecchymosis, haematoma). The importance of this type of goring lies in the fact that during inspection and even during palpation, it can be mistaken with a simple contusion.[1,6]

Similarly in our case, it was initially mistaken as an abrasion over anterior abdominal wall, 9 cm below umbilicus. However, under a false appearance of mildness, injuries were extremely severe causing bowel perforation and required emergency surgery.

Bull horn injury is not uncommon, and during a 12 year period, 101 patients treatment at Vellore in South India. The ages of these patients ranged from two years to 90 years and the male to female ratio was 4:1. Sixty-one per cent of the injuries occurred either to the perineum or abdomen and wounds were directed obliquely upward. Thirty-five per cent required extensive surgical intervention. The overall wound infection rate was 12.9 per cent. Of wounds that were primarily closed, 42.9 per cent had wound infection, while only 6.3 per cent that were secondarily closed developed infection. Two patients died as a consequence of the injury.[2,7]

Being gored by a bull in the abdomen is a most likely devastating and possibly fatal injury. These are the ultimate "snag" injuries that usually result in the runner being impaled with the weight of the body causing the horn to penetrate deeper into the tissues. The real danger comes if the horn penetrates through the abdominal wall and goes into the peritoneal or retroperitoneal cavities. The most devastating area of injury would be to the retroperitoneal structures - duodenum, kidneys, aorta, vena cava, and pancreas. An injury to the aorta or vena cava would be immediately life-threatening in the fields.[3,5]

Bull-horn wounds are incisive and contusive, they have special characteristics

- The entry opening is usually small and surrounded by an erosion zone
- One or more in depth tracts may be present, usually with important muscular destruction
- These wounds are contaminated, and multiple foreign bodies may found at the bottom of the wound tract, including cloth fragments, dirt, and horn chips.

The depth is dependent on the force of penetration of the bull's horn into the body (which is the result of the

animal's weight and speed). There is an additional force because of the effect of the bulls strong neck muscles when it raises its horns. This force causes upward tears at right angles to the ground. If the injured person is lifted, his body weight exerts an opposite force. Finally, when the patient's body is lifted and suspended by the bulls horns, it is in an unstable balance which, depending on the location of the center of gravity relating to the horn, causes a rotational movement (with ensuing tears of arteries, veins, and nerves), combined with the animals efforts to disengage the person's body.[4]

In our case the direction of bull horn injury over anterior abdominal wall was upwards and laterally. The entry and exit wound was seen in terminal ileum ten cm away from ileocaecal junction along with posterior peritoneal wall wound just medial to left common iliac vessel fortunately sparing them.

CONCLUSION

In rural India, bull is very useful animal for domestic and farming purpose. This domestic animal has caused shockingly dangerous injuries by accidental bull horn injury. These events are quite dangerous and result in frequent bull horn wounds. Early treatment is required to prevent further morbidity and mortality. Therefore, it is useful for raising awareness of this type of injury.

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