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TRAUMA SURGERY

A 12-year review of equestrian related injuries at a major trauma centre in South Africa

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Background: Few studies on equestrian-related injuries have specifically focused on patients in South Africa. The aim of this study was to review the spectrum of injuries and of patients treated at state-funded trauma centres in South Africa.
Methods: A retrospective study was conducted over a 12-year period from July 2012 to February 2025 on all patients treated for equestrian-related injuries.
Results: A total of 82 patients were included (83% male, median age: 17 years, median injury severity score (ISS): 9). The most common mechanism of injury was a fall (n = 41), followed by a kick (n = 38). Two were trampled, and one dragged. The most commonly injured body regions were head and neck (n = 49), face (n = 29), and chest (n = 17). Eighty-two percent (67/82) were managed non-operatively. The overall morbidity was 21% (17/82). Respiratory complications were the most common (n = 7). The median length of hospital stay was two days (range 0–45). There were two mortalities (2%), both due to a fall from a horse resulting in severe traumatic brain injury (TBI).
Conclusions: Horse-related injuries are serious and can result in significant injuries. A significant number of patients required major operative interventions. Both riders and non-riders are at risk of injury and appropriate safety equipment and education is essential.
Keywords: equestrian injuries, horse-related trauma, major trauma centre, South Africa, retrospective study, surgical management

Introduction

Humanity has a long and profound relationship with horses. The horse has accompanied human beings through all our historical epochs in both military and more bucolic pursuits. In the modern day, with the rise of motorised transport, our daily interaction with horses has significantly reduced. There remains a considerable number of people who interact with horses regularly. These equestrian pursuits include sporting activities and agriculture. There are definite physical risks associated with equestrian pursuits. Horses are powerful animals with a prominent instinct of fight or flight. Humans attempt to mitigate this unpredictability by training. Despite these efforts to make horses pliant around humans, they remain prone to unpredictable behaviour.[1] When placed in a threatening or unfamiliar situation, a horse may suddenly run, kick, buck, or bite, resulting in potentially significant injuries. Any interaction between humans and horses has some risk but this varies with horsemanship experience. It is imperative that these risks be understood so that appropriate steps can be taken to mitigate them.[1] Most of the literature on equestrian-related injury emanates from high income regions (e.g., North America, Australasia and Western Europe),[2-8] and very few focus on the spectrum and outcomes of patients managed in low- and middle income settings. The aim of this study was to review the cumulative experience of a single high volume trauma centre, based in a city with a deep rural imprint, with injuries related to equestrian pursuits.

Materials and methods

Clinical setting

This was a retrospective study conducted at the Grey's Hospital in Pietermaritzburg, the capital city of KwaZulu-Natal (KZN) province in South Africa. Grey's Hospital is a 500-bed tertiary hospital and is one of the largest academic trauma centres covering the western third of the province. Data was also included from Edendale Hospital, a major regional hospital in the same city. There are three million people in this region. Although Pietermaritzburg is a city, it is located within a rural and peri-rural environment, where there is significant agricultural activity, and where there is a high rate of human interaction with horses. Our institution maintains a hybrid electronic medical registry (HEMR) which captures clinical data on all admitted patients. This registry has been in use since 2012.

The study

This study was conducted over a 12-year period from January 2013 to February 2025. All patients who were treated for equestrian-related injury were retrieved from our registry and reviewed. Ethics approval for the maintenance of this

registry for both clinical care and research has been formally endorsed by the Biomedical Research Ethics Committee (BREC) of the University of KwaZulu-Natal (UKZN), with approval numbers BCA207/09 and BCA221/13.

Statistical analysis

All relevant data was extracted and initially summarised onto a Microsoft EXCEL© spreadsheet for review. Continuous variables were presented as medians, and categorical variables as frequencies and percentages. The student's t-test was performed on all continuous variables. The chi-square test was performed on all categorical variables with counts greater than five, and Fisher's exact test for counts less than five. Statistical analysis was performed using SPSS version 19 (IBM Corp., Released 2010. IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp.) and R (version 4.3.3, R Foundation for Statistical Computing, Vienna, Austria). This is an earlier version of SPSS; however, the descriptive analysis undertaken is unaffected by the software version.

Results

Overview

During the 12-year study period, a total of 82 patients with equestrian-related injury were treated at our trauma centre. The yearly incidence of injury is summarized in Figure 1. Eighty-three per cent (68/82) were males. The median age was 17 years (range 0–81).

Admission Physiology

Table I summarises the mean value of admission physiology. The median injury severity score (ISS) was 9 (1–25).

Mechanism of injury

The most common mechanism of injury was a fall ($n = 41$), followed by a kick ($n = 38$). Two patients were trampled, and one dragged.

Table I: Physiology on presentation

Median HR (BPM)	92
Median SBP (mmHg)	120
Median lactate (mmol/L)	1.55
Median GCS	15
Mean pH	7.37
Mean Hb (g/dL)	12.5

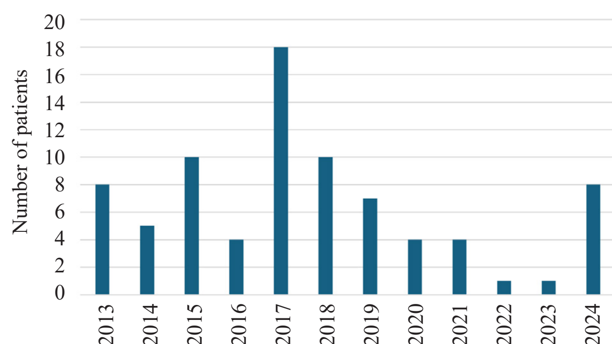

Figure 1: Annual incidence of equestrian-related injuries, 2013–2022

Table II: Regions injured

Head	44
Face	29
Neck	5
Chest	17
Abdomen	14
Pelvis	1
Upper Limb	7
Lower Limb	4

Table III: Laparotomy findings

Mechanism	Injury
Blunt Trauma	Single small jejunal perforation with a serosal tear with soiling of the entire abdomen
Blunt Trauma	Small bowel perforation with 4 quadrant contamination.
Blunt Trauma (Relaparotomy)	Malrotation of the colon with an abnormally long mesentery and the appendix located in the left lower quadrant.
Blunt Trauma (Relaparotomy)	Superficial wound sepsis, necrotic ileostomy stump with serosal tear of ileum
Blunt Trauma (Relaparotomy)	Serosanguinous fluid, present in all four quadrant
Blunt Trauma (Relaparotomy)	Abdominal wall sheet necrosis sheath necrosis, serosanguineous fluid, pocket of pus around stoma site intra-abdominally
Blunt Trauma	Small bowel laceration on antimesenteric border
Blunt Trauma	Grade IV liver injury with haemoperitoneum
Blunt Trauma	Proximal jejunal injury, pancreatic contusion, grade II renal injury
Blunt Trauma	No injuries found

Pattern of injury

Table II summarises the anatomical distribution of injury. There were 121 injuries identified in 82 patients. The most commonly injured body regions were head and neck (n=49), face (n=29), and chest (n=17). Table III summarises the spectrum of abdominal injuries.

Radiological imaging

Of the 82 patients, 71 underwent imaging. The most common modality was CT ($n = 62$), followed by chest X-ray ($n = 22$), abdominal X-ray ($n = 3$). Of the patients who underwent CT, the head (n =51) was the most common body region imaged. 23 patients had imaging to two or more body regions. This is summarised in Table IV.

Table IV: CT imaging by body regions

Head	51
Neck	17
Chest	5
Abdomen & pelvis	13
Whole body	3

Clinical management

Eighty-two per cent (67/82) were managed non-operatively. 15 patients underwent 21 procedures. The operative procedures were summarised in Table V.

Table VI: Operative and non-operative outcomes

Variable	Operative ($n = 15$)	Non-operative ($n = 67$)	P value
Complications	7 (46.7%)	10 (14.9%)	$p = 0.01$
ICU admission	5 (33.3%)	4 (6%)	$p = 0.009$
Length of stay	4.0 (±13.7)	2.0 (±3.1)	$p = 0.05$
Mortality	1 (6.7%)	1 (1.5%)	$p = 0.33$

Table VII: Summary of relevant studies

Author	Year	Country	Number of cases	% operated	ICU admission	Mean LOS	Mortality
Wilkinson-Smith et al.	2025	South Africa	82	18.35 ($n = 15$)	11.1% ($n = 9$)	3.96	2.4% ($n = 2$)
Hoffmann et al.[13]	2023	U.S.A	95	55.6% ($n = 55$)	Not Reported	10.0	1.05% ($n = 1$)
Mutore et al.[14]	2021	U.S.A	24 791	9.8% ($n = 2,435$)	28.3% ($n = 7,021$)	4.46	1.3% ($n = 320$)
Gharooni et al.[15]	2021	U.K.	301 (all with ISS ≥ 4)	45.8% ($n = 138$)	25.9% ($n = 78$)	8.56	1% ($n = 3$)
Serio et al.[16]	2019	U.S.A	27	26% ($n = 7$)	41% ($n = 11$)	4.5	0% ($n = 0$)
Gross et al.[17]	2019	Israel	53 (children)	45.3% ($n = 24$)	23% ($n = 12$)	4.3	1.9% ($n = 1$)
Meredith et al.[18]	2019	Sweden	29 850	25% ($n = 7,484$)	Not Reported	1.9	0.17% ($n = 51$)
Jones et al.[19]	2018	New Zealand	701	Stated as half of all patients. No number given.	Not Reported	3.4	0% ($n = 0$)
Davidson et al. [20]	2015	U.S.A.	90	33% ($n = 30$)	Not Reported	3.7	6.66% ($n = 6$)
Yim et al.[11]	2007	Hong Kong	36	28% ($n = 10$)	11.1% ($n = 4$)	1.5	0% ($n = 0$)

Table V: Operative management

Debridement	3
Laparotomy	6
Craniotomy	5
Splenic artery embolisation	2
Gastrostomy	2
Tracheostomy	2
Split skin graft	1

Clinical Outcomes

The overall morbidity was 21% (17/82). There were 19 complications in 17 patients. Respiratory complications were the most common ($n = 7$). The median length of hospital stay was two days (range 0–45). There were two mortalities (2%), both due to a fall from a horse resulting in a severe TBI.

Operative and non-operative outcomes are summarised in Table VI. There were statistically significant differences in LOS, ICU admission, and complications between the two groups.

There were six postoperative complications in 5 patients. Postoperative complications were graded according to the Clavien-Dindo Classification of Surgical Complications.[9] One complication was grade I, three were grade IIIb and two were grade IVa.

Discussion

In the modern era, the groups of humans who are likely to interact with horses are workers engaged in agricultural activities and people who are engaged in equestrian sports. Horse-related injuries are not uncommon in trauma centres in peri-urban areas adjacent to rural and agricultural areas.[5-6,10-11] It is important that clinicians caring for emergency patients are familiar with equestrian-related trauma. It is also essential that humans who interact with horses are aware of the potential dangers and practice safe horse handling.[1] In high income countries, the majority of patients who sustain an equestrian-related trauma are female.[5,8] They are also more likely to be interacting with horses for sport or recreation.[5,10-12] In our series the majority were young men who are likely to be farm workers.

The most common mechanism of injury is a fall from the horse followed by a kick. The most injured body region is the head, neck and face. The only two deaths in the cohort, both of whom sustained severe TBI, again emphasises the need for riders to wear appropriate head gear. Injuries to the chest and abdomen are almost exclusively secondary to a kick. Chest injuries secondary to a kick were usually treated non-operatively. These could be morbid injuries as the high rate of respiratory complications bears out. Kicks to the abdomen are morbid and two out of the six patients who had such an injury sustained a small bowel perforation and required a laparotomy.

Previous studies examining equestrian injury are summarised in Table VII. There was considerable variability in the percentage of patients operated on (9.8–55.6%). Our own figure of 18.29% fits within this range, but is at the lower end. We found 11.1% of patients were admitted to the ICU in our own dataset. This is significantly lower than four of the five studies that reported ICU admission. The mean LOS in our data set was 3.96. Once again, the nine studies had a large range of values for LOS. Mortality was low across all the studies, which is similar to our finding of two deaths in 81 patients.

Limitations

There are several limitations to our study. Firstly, this was based on our experience in a single centre with a highly rural catchment population. It is possible that patients with lesser degree of injury may not have been referred and/or

transferred to our trauma centre. Secondly, our centre is a public hospital. Patients who engage in sporting related equestrian activities are more likely to be able to afford private insurance and therefore likely treated at private hospitals. Our study, therefore, may not describe the full spectrum of injuries encountered.

There are two main dangers in handling horses, namely falls and kicks. Falls are associated with injury to the head and neck, these can be mitigated by wearing appropriate safety gear.[21] Kicks to the chest result in rib fractures. Kicks to the abdomen are associated with blunt enteric injuries which require a laparotomy and are associated with significant morbidity.[22] Education on handling horses safely is essential.[1]

Conclusion

Horse-related injuries are serious and can necessitate major surgical management. Prevention strategies must be put in place when working with horses. For riders, who are at risk of head and neck injury, appropriate safety gear must be worn. Non-riders, who are at risk of kicks, must be well informed about safe behaviour around horses. Promotion of these practices is vital to lessen the burden of equestrian trauma moving forward.

Conflict of interest

The authors declare no conflict of interest.

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None.

Ethical approval

Prior to commencement of the study, ethical approval was obtained from the University of KwaZulu-Natal Biomedical Research Ethics Committee (BREC BCA221/13).

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