

Ballistic Trauma in a Western Lowland Gorilla Managed in a Level 1 South African Trauma Center

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A 26-year-old Western Lowland gorilla sustained two gunshot wounds during a violent incident at Johannesburg Zoo in July 1997 and was transferred for multidisciplinary evaluation by veterinary and human trauma teams. Clinical examination, serial physiological assessment, and radiographic trajectory analysis demonstrated tangential cervical injury and a retained projectile without evidence of major vascular, airway, skeletal, or visceral injury. Selective non-operative management was undertaken. The patient remained hemodynamically stable and recovered without operative intervention. This case demonstrates successful application of established human trauma principles to veterinary trauma management through multidisciplinary collaboration. It also raises some questions about modern trauma management and theoretical application of endovascular tools.

Keywords: *Ballistic Trauma; Gorilla; Veterinary Trauma; Non-Operative Management; Retained Bullet; Trauma Surgery*

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INTRODUCTION

Ballistic trauma in great apes is exceptionally uncommon and rarely described in the medical or veterinary literature [1,2]. This report describes the management of a Western Lowland gorilla with gunshot injuries using established human civilian trauma principles at a South African Level 1 Trauma Center. The case highlights the translation of modern penetrating trauma management strategies, including selective non-operative management (NOM), radiological trajectory analysis, and avoidance of unnecessary retained projectile extraction, into zoological medicine. The case also might raise some theoretical thoughts on modern treatment possibilities.

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This case report was prepared in accordance with the CARE reporting guidelines.

CASE PRESENTATION

On 18 July 1997, a violent incident occurred at Johannesburg Zoo when an armed intruder entered the gorilla enclosure while attempting to evade police. During the confrontation, a 26-year-old male Western Lowland gorilla named Max sustained two gunshot wounds involving the neck and upper torso region. Following initial stabilization by the Johannesburg Zoo veterinary team, the animal was sedated, intubated, and transferred to Milpark Hospital, then the only Level 1 Trauma Center in South Africa, for further trauma assessment and radiological evaluation See Figure 1. The primary concern on arrival was to determine whether the injuries represented deep penetrating ballistic trauma or tangential wounds without major cavitory violation.

Initial Assessment and Imaging

The veterinary team managed sedation, airway support, ventilation, and physiological monitoring throughout transport and hospital evaluation. The trauma team performed structured clinical assessment using established human trauma principles. Radiological imaging was performed with external metallic markers placed over the

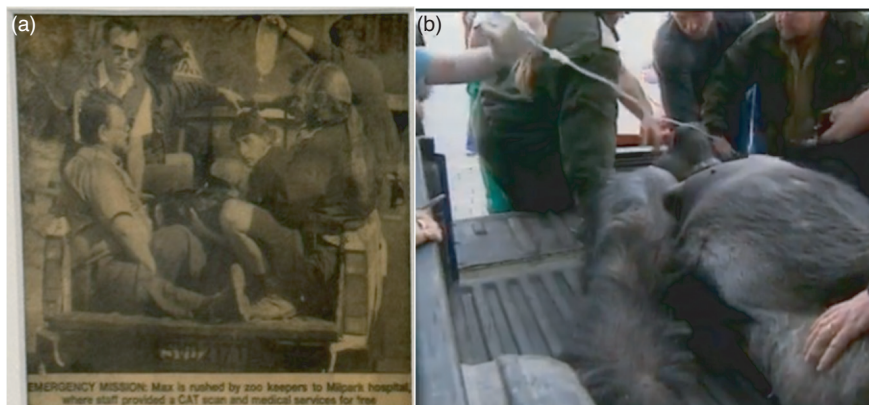


Figure 1 Transfer to the hospital. **(a)** Transfer of Max to Milpark Hospital after initial zoo stabilization and **(b)** arrival at the trauma center and multidisciplinary reception.



Figure 2 Transfer to the hospital. **(a)** Multidisciplinary admission for initial trauma assessment. **(b)** Airway and ventilation management. **(c)** and **(d)** Imaging in the emergency room by multidisciplinary veterinary and trauma team.

suspected wound trajectory to define bullet pathways and correlate external wounds with internal findings. See Figure 2. X-ray imaging demonstrated a tangential anterior cervical trajectory passing anterior to the airway structures without evidence of major airway or vascular injury. Additional imaging identified a retained projectile adjacent to the left proximal humerus without obvious skeletal disruption or deformity. See Figure 3.

Management Strategy

Based on the absence of hemodynamic instability, major vascular injury, skeletal destruction, or evidence of

cavitary penetration, selective NOM was chosen. The retained projectile was not surgically removed.

Outcome and Follow-up

The patient remained hemodynamically stable throughout assessment and did not require operative intervention. The entire trauma room process reportedly lasted approximately 35 minutes from arrival to discharge. See Figure 4. Clinical follow-up at Johannesburg Zoo the following day demonstrated preserved mobility and full use of the injured limb without apparent neurological deficit. Subsequent short-term follow-up remained

uncomplicated. Long-term behavioral and physiological changes were later suspected but remain speculative in the absence of formal pathological or toxicological evaluation See Figure 5.

DISCUSSION

This case demonstrates the successful application of human civilian trauma principles to the management of ballistic injury in a great ape. The central educational value lies not in the rarity of the species involved, but in the translation of evidence-based trauma concepts across species boundaries [1,3–7].

The team decided on NOM because operative extraction would have required extensive dissection through deep muscular structures with increased tissue trauma and prolonged anesthetic exposure. Contemporary trauma principles recognize that retained

bullets are frequently biologically inert and that removal might produce greater morbidity than retention unless specific indications are present [4]. Avoidance of unnecessary surgery was particularly important given the anesthetic, physiological, and logistical challenges associated with management of a large non-human primate.

Selective NOM has become a cornerstone of modern penetrating trauma care in high-volume trauma systems [4–6]. The decision-making process in this case closely paralleled contemporary human ballistic trauma algorithms emphasizing physiological stability, careful imaging assessment, and avoidance of unnecessary exploration. The use of external bullet markers during imaging represented an important practical adjunct in determining wound trajectory and excluding major cavitory penetration. Although commonly used in trauma radiology, this technique is infrequently described in zoological trauma management [2,8]. One might add that computed tomography (CT) could have been used to identify the injuries pattern but body size and weight might have limited the possibilities to perform CT in this case.

The case also highlights the importance of multidisciplinary collaboration between veterinary and trauma surgery teams. Airway management, sedation, transport logistics, physiological monitoring, imaging, and clinical decision-making required coordinated interaction between multiple disciplines. Retained projectile management remains an important issue in both human and veterinary trauma care. Modern literature generally supports selective retained bullet removal only when clear indications exist, including infection, intra-articular location, migration risk, vascular compromise, or persistent symptoms attributable to the projectile [1,3,7].

In general, one might hypothesize that use of endovascular or hybrid tools to stop ongoing large vessels bleeding could

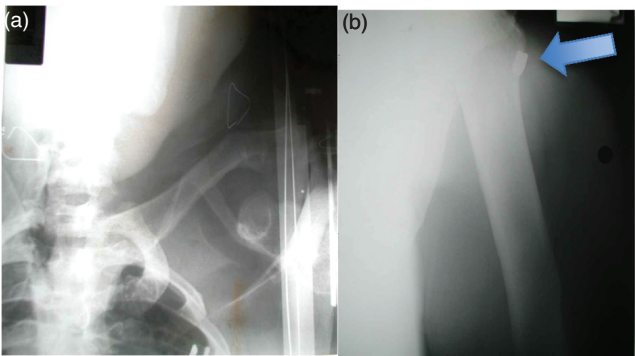


Figure 3 Radiology findings. (a) Completion of radiographic assessment and radiographic demonstration of tangential cervical trajectory anterior to airway structures. (b) Retained projectile near the proximal left humerus bone (blue arrow).

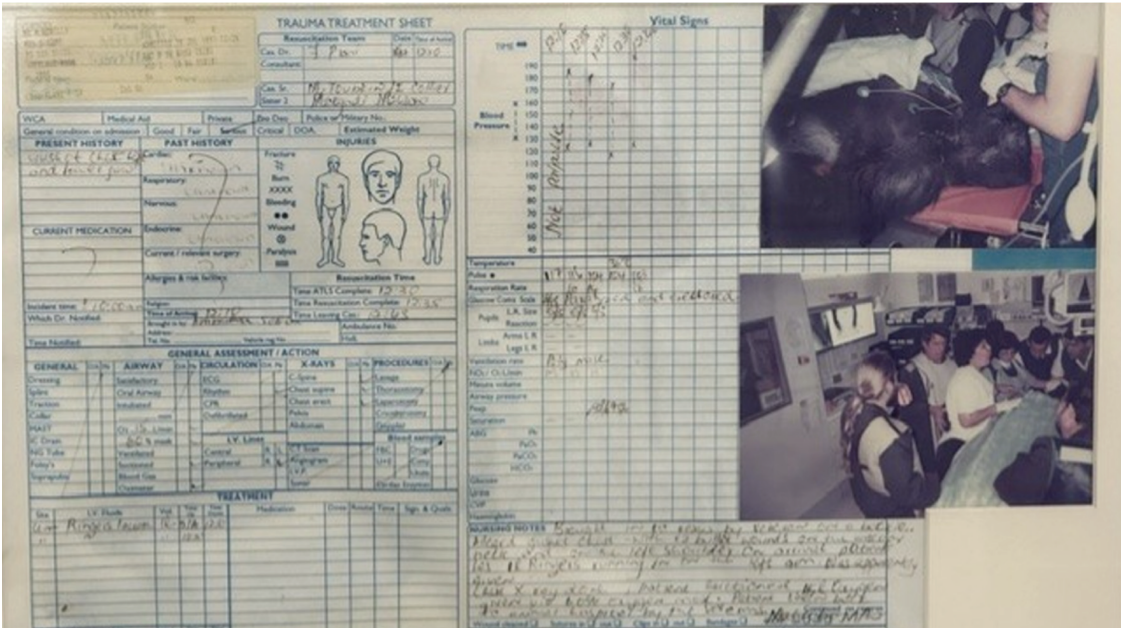


Figure 4 Trauma documentation and admission records.



Figure 5 Follow up. **(a)** Photograph at the zoo the following day and **(b)** memorial bronze statue after Max's death. Max was psychologically scarred by this incident, developed behavioural changes in line with post traumatic stress syndrome, and was found on two occasions to have low sperm count, which made it impossible for Lisa, his 120 kg female gorilla partner, and him to have babies. His life span was less than expected, since he died in 2004, at only 33 years, well below the expected 50–60 year longevity of his species in captivity.

be helpful. Exposure of axillar, subclavian, or other major vessels in a very muscular ape would have been challenging, and wide exposure would probably have been harmful. At least in theory, the use of balloon occlusion, endograft, and embolization could have been helpful [9].

CONCLUSION

This case report illustrates the successful management of ballistic trauma in a Western Lowland gorilla using modern civilian trauma principles and selective non-operative management strategies. The case further demonstrates the value of multidisciplinary cooperation between veterinary and human trauma systems and represents an unusual but important example of cross-species application of evidence-based trauma care.

Ethics Statement

This manuscript represents retrospective reporting of a historical clinical case. No experimental intervention was performed. No ethical approval was needed.

Conflicts of Interest

The author declares that they have no conflicts of interest.

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Author Contributions

The author was responsible for case management, manuscript preparation, and final approval of the submitted version.

Data Availability

No datasets were generated or analyzed during the preparation of this case report.

Declaration of the Use of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the author used ChatGPT5.2 for English revision only. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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