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TRAUMATIC GLOBE SUBLUXATION CAUSED BY NAIL - A CASE REPORT

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Abstract: **Traumatic globe subluxation, though relatively infrequent, represents a significant ocular emergency with potential cosmetic and visual sequelae. This report details the clinical presentation and management of a 19-year-old secondary school student who sustained a left traumatic globe subluxation and associated upper eyelid laceration. The injury occurred when the patient, navigating in darkness, inadvertently impacted his left eye against a protruding nail base affixed to a door. This case underscores the importance of prompt ophthalmologic intervention in mitigating the functional and aesthetic consequences of globe subluxation following ocular trauma. Furthermore, it highlights the inherent risks associated with ambulation in low-light conditions, emphasising the need for heightened awareness to prevent similar injuries. Early diagnosis and appropriate management are essential for optimising visual recovery and minimising long-term complications.**

Keywords: **Globe subluxation, ocular trauma, eyelid laceration, visual impairment, emergency ophthalmology, injury prevention.**

1. INTRODUCTION

Ocular trauma, encompassing both accidental and intentional injuries, presents a diverse spectrum of clinical manifestations [1]. The myriad circumstances leading to ocular injury reflect the breadth of human activity [1]. Paradoxically, even structures intended for safety or assistance can become sources of ocular insult [2, 3, 4, 5]. Occupational settings, in particular, frequently witness a significant burden of ocular injuries [6]. The causative agents range from blunt force to sharp projectiles [6]. Within domestic environments, seemingly innocuous objects like nails can pose a substantial risk of ocular morbidity.

Globally, the impact of ocular injuries is profound, with an estimated 1.6 million individuals experiencing blindness, 2.3 million suffering bilateral visual impairment, and 19 million sustaining unilateral visual loss [7]. In Nigeria, numerous studies have documented the prevalence and severity of ocular injuries [8, 9, 10, 11, 12, 13, 14]. Nails, commonly employed in construction and workshops, represent a potential hazard for general and ocular injury [1]. The introduction of nail guns in the 1950s coincided with a surge in reported injuries to various organ systems [15, 16, 17, 18, 19]. In China, Wu H et al. [20] reported that 59.7% of work-related ocular injuries stemmed from metal or nail projectiles. Similarly, in Nigeria, nails and other sharp objects have been implicated in penetrating eye injuries [1, 21].

Traditional classifications of globe injuries delineate closed globe injuries (CGI) and open globe injuries (OGI) [22, 23, 24, 25, 26, 27, 28, 29]. Additionally, globe luxation and avulsion (GA) represent a distinct category, with varying degrees of severity. Globe luxation can manifest as partial (limited prolapse without optic nerve or extra-ocular muscle involvement) or complete (prolapse with severed optic nerve and extra-ocular muscles) [30, 31, 32]. Globe luxation or avulsion, a relatively rare occurrence, typically follows trauma, though spontaneous instances have been documented [33]. Regardless of the extent of globe prolapse, functional, structural, and aesthetic consequences are often observed [30, 31, 34]. Globe subluxation, defined as the acute anterior displacement of the globe's equator beyond the orbital rim with eyelid retraction,

frequently results in optic nerve stretching [35]. Corneal irritation, through orbicularis muscle contraction, can exacerbate globe subluxation [36].

Beyond trauma, systemic conditions such as thyroid eye disease, shallow orbits (as in Crouzon syndrome and Apert syndrome), chronic pulmonary diseases, and floppy eyelid syndrome can predispose to globe luxation [37, 38, 39]. Traumatic globe luxation remains a rare entity, with only 109 cases reported as of 2021, predominantly affecting males [40, 41, 42]. Traumatic globe luxation into the paranasal sinuses, though exceedingly rare, has been reported, with 24 cases documented as of 2016 [42, 43]. Maxillary sinus involvement is most common, followed by the ethmoidal sinus, and traffic accidents account for a significant proportion of cases (42%) [42, 43]. Moris et al. [44] proposed three mechanisms for globe luxation: (i) elongated object acting as a fulcrum, (ii) wedge-shaped object displacing the globe anteriorly, and (iii) direct optic nerve transaction.

This report details a case of ocular manifestation of nail trauma in a 19-year-old male secondary school student in Awka, Anambra State, Nigeria. The injury occurred during nocturnal ambulation in complete darkness.

2. CASE REPORT

A 19-year-old male secondary school student presented to the Accident and Emergency Unit of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Awka, with a history of left ocular trauma sustained the previous night (August 1, 2024). The patient reported inadvertently impacting his left eye against a 3-inch nail protruding from the convenience door while navigating in complete darkness. This resulted in left eyelid pain, bleeding, and globe protrusion. The patient, residing as a domestic assistant under the guardianship of a woman, was subsequently referred to the Ophthalmology Unit for evaluation and management. Further inquiry confirmed isolated ocular injury.

Ophthalmologic examination revealed a 3cm horizontal laceration of the left upper eyelid, lid ecchymosis, significant left globe proptosis, conjunctival congestion, and chemosis. The left eyelid margins were noted to be retracted posterior to the globe's equator. Extraocular movements were severely restricted in all directions. Palpation revealed no crepitus, and no cerebrospinal fluid rhinorrhea was observed. The orbital rim was intact, and fluorescein staining of the cornea was negative. There was no evidence of globe rupture or anterior chamber hemorrhage. The right eye exhibited normal findings. Visual acuity was reduced to counting fingers at 6 meters in both eyes (Fig. 1).

Fig.1 Prolapsed left globe

To mitigate corneal and conjunctival desiccation, the ocular surface was intermittently irrigated with sterile normal saline, followed by the application of a generous layer of chloramphenicol ophthalmic ointment. Subsequent pharmacotherapy included chloramphenicol eye drops, oral paracetamol, and oral metronidazole. A single dose of 0.5 mL tetanus toxoid was administered intramuscularly, and 1 gram of ceftriaxone was administered intravenously.

The patient was then transferred to the operating theater for examination under anesthesia, globe reduction, and eyelid laceration repair. Exophthalmometry, utilizing a Luedde exophthalmometer, revealed measurements of 13 mm for the right eye and 19 mm for the left eye, indicating significant proptosis. A 4/0 silk suture was strategically placed at intervals, commencing from the junction of the middle and lateral thirds of the lower eyelid, extending towards the lateral canthus, approximately 4 mm from the eyelid margin. This procedure was replicated on the upper eyelid using a separate 4/0 silk suture. Following liberal application of chloramphenicol ophthalmic ointment to the globe and eyelids, the sutures were divergently retracted.

Globe reduction was achieved using two cotton-tipped applicators, moistened with sterile normal saline, to apply gentle, opposing pressure at the lateral canthus. This controlled pull-and-push technique facilitated the return of the globe to the orbit, accompanied by an audible popping sound (Fig. II).

Fig. II: After reduction of the globe.

Post-reduction, a thorough ophthalmologic examination revealed complete restoration of extraocular motility in all directions. Chloramphenicol and fluorometholone ophthalmic drops, along with chloramphenicol ophthalmic ointment, were instilled, and the eye was patched. On the first post-operative day, the patient demonstrated marked clinical improvement, with visual acuity recorded as 6/18 in the right eye and 6/36 in the left eye. Fundoscopic examination revealed flat retinas bilaterally, with a mild vitreous haze observed in the left eye. The patient was prescribed the following additional medications: oral ampiclox 500 mg three times daily for five days, oral metronidazole 400 mg three times daily for five days, oral chymotrypsin one tablet three times daily for one week, and oral paracetamol 1000 mg three times daily for four days.

The patient was discharged on the fifth post-operative day with instructions to present the offending nail at his next appointment. At the one-week follow-up, the patient exhibited significant clinical improvement. However, visual acuity remained 6/18 in the right eye and 6/36 in the left eye, improving to 6/9 in both eyes with pinhole testing. The patient reported no prior lens use. Refractive assessment and spectacle prescription were deferred to a subsequent appointment due to financial constraints. Unfortunately, the patient did not attend further scheduled appointments.

Fig. III: The offending nail

3. DISCUSSION

In the majority of reported ocular nail injuries, the nail acts as a high-velocity projectile [1, 18, 19, 20, 21, 45]. These projectiles, possessing significant kinetic energy (KE = ½ mv^2), where KE represents kinetic energy, 'm' denotes mass in kilograms, and 'v' signifies velocity in meters per second squared [46, 47], are capable of inducing perforating or penetrating ocular trauma [48]. In contrast, the present case involved a stationary nail, with the patient's motion being the primary kinetic factor. This, coupled with the impact of the nail's head rather than its pointed tip, likely mitigated the severity of the injury, resulting in upper eyelid laceration and globe protrusion rather than a penetrating or perforating globe injury.

The precise mechanism of globe prolapse in this scenario remains speculative. It is plausible that reflexive orbicularis oculi muscle spasm, with subsequent retraction behind the globe, contributed to the globe's anterior displacement. Literature suggests that objects insinuated into the superomedial orbit can induce both globe prolapse and secondary severe reflex orbicularis oculi spasm, effectively locking the globe in an anterior position [34, 49]. Furthermore, ocular trauma from objects like bicycle handlebars, gift-wrapping tubes, door handles, and fences may induce globe prolapse through secondary elevation of intraorbital pressure, with simultaneous posterior displacement of the upper eyelid [50, 51, 52].

Previous reports have documented complications such as keratopathy, branch retinal vein thrombosis, and optic neuropathy following globe subluxation [53, 54, 55]. In this case, corneal and conjunctival xerosis were averted due to the brevity of exposure and the prompt implementation of protective measures. Similarly, the timely reduction of the prolapsed globe likely prevented central retinal vein thrombosis. Optic nerve or extraocular muscle avulsion, associated with sharp object trauma and severe maxillofacial injuries like Le Fort II or III fractures, have been described [32, 58]. The lamina cribrosa region of the optic nerve, lacking a myelin sheath, is particularly vulnerable [58]. However, the optic nerve's inherent S-shaped intraorbital course, approximately 25-30 mm in length, facilitates globe movement without compromising nerve function [59, 60]. In this case, the absence of optic nerve dysfunction, despite significant globe protrusion, may be attributed to this anatomical feature [59, 60]. The unhindered return of the globe to the orbital cavity, accompanied by an audible popping sound, suggests the absence of increased intraorbital pressure or orbital space compromise. In severe proptosis, the loss of the optic nerve's S-shaped configuration can lead to nerve stretching and compression, resulting in visual loss through stretch optic neuropathy [60]. The prevention of exposure keratitis, conjunctival, and corneal xerosis in this case was likely due to the continuous irrigation of the cornea and conjunctiva with normal saline, liberal application of chloramphenicol ophthalmic ointment, and immediate globe reduction.

4. CONCLUSION

Globe subluxation, an ophthalmic emergency, can result from ocular and facial trauma, presenting with both cosmetic and visual implications. Prompt intervention is crucial for restoring visual function and minimizing long-term complications and cosmetic sequelae. Ambulation in darkness poses a significant risk for general and ocular trauma.

Ethical considerations

Informed consent was obtained from the patient for the use of the photograph.

There is no conflict of interest.

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