

Life Threatening Laryngeal Injury in Elite Rugby Union: Prevention and management

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Abstract

Laryngeal injury is a life-threatening risk in contact sports. Exercise-induced laryngeal obstruction (EILO) can occur as a result of trauma. Athletes can return to monitored training within weeks of laryngeal surgery. Due to the rarity and complexity of laryngeal trauma in sport, effective management requires a multidisciplinary approach.

Life Threatening Laryngeal Injury in Elite Rugby Union: Prevention and management

KEY POINTS

- Laryngeal injury is a life-threatening risk in contact sports carries and has severe morbidity.
- Exercise-induced laryngeal obstruction (EILO) can occur as a result of trauma.
- Athletes can return to monitored training within weeks of laryngeal surgery.
- Due to the rarity and complexity of laryngeal trauma in sport, effective management requires a multidisciplinary approach for acute in-field management, hospital care, and the rehabilitation phase of recovery.
- Future work should focus on improving understanding and then minimizing the risk factors underlying traumatic laryngeal injury in all sports.

Keywords: larynx, sport, breathing, fracture, trauma, rugby

Key clinical message

Laryngeal trauma is a life-threatening injury in contact sports. Due to its potentially devastating consequences, the prevention, diagnosis, and management of neck trauma both pitch side and at the hospital are essential for athletes.

INTRODUCTION

Laryngeal trauma is a life-threatening injury resulting from above the shoulder contact and can cause acute upper airway compromise with fatal consequences. It accounts for between 1 per 14,000 to 30,000 accident and emergency attendances(1). Due to its potentially devastating consequences, the prevention, diagnosis and management of neck trauma both pitch side and at the hospital are essential for athletes.

MATERIAL & METHODS

In September 2017, a 28-year-old male international rugby player sustained direct trauma to the left side of his neck during an English Premiership match (Figure 1 and see <https://www.youtube.com/watch?v=TodNq3aGFzk>).

He was immediately apnoeic for a few seconds, rapidly developing respiratory compromise. He was given basic airway support with supplementary oxygen and transferred to hospital.

Once stabilised, computer tomography (CT) imaging revealed a fracture of the posterior cricoid cartilage into the left arytenoid (Figure 2). Direct laryngoscopic revealed oedema and local haemorrhage (Figure 3A). Using the Becker (modified Schaefer) classification of laryngeal trauma, the injury was graded as a group 2(2). The fracture was managed conservatively with intravenous steroids and clinical surveillance in a high dependency unit, mandating a week-long stay in hospital.

Subsequent clinic management

Specialist upper airway speech and language therapy (SLT) assessment one week after injury revealed turbulence on inspiration, a weak, breathy voice and swallowing impairment. Initial therapy focused on voice conservation and postural adjustments to avoid further strain and facilitate healing, use of core breathing patterns combined with exercises to encourage vocal fold abduction.

Over eight therapy sessions, the intensity of laryngeal abduction and forward resonance exercises was increased with improvements to both voice and respiratory function. Biofeedback laryngoscopy was used to improve laryngeal control for breathing.

Management of trauma-induced exercise-induced laryngeal obstruction

Despite intensive therapy, the patient remained breathless on exertion. A diagnosis of exercise-induced laryngeal obstruction (EILO) secondary to trauma was suspected. Continuous laryngoscopy during exercise (CLE) test(3) was performed and revealed a prolapse of the left arytenoid, which increased with exercise intensity.

He subsequently underwent a left arytenoidectomy five weeks after the injury. Post-operative therapy was tailored to support a phased return to fitness training. Attention was given to maintaining core breathing patterns, in combination with effective laryngeal manoeuvres to maximise glottal aperture, confirmed on laryngoscopy. He made his return to training one month after surgery.

The CARE case report guidelines were used when writing this report.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

RESULTS

The SLT attended training sessions and monitored breathing symptoms as exercise intensity increased. At eight weeks following laryngeal surgery there was no compromise to breathing on exertion of up to 160bpm and there was no discernible deficit in vocal function. He returned to professional play in March 2018 (i.e. six months after the initial injury).

DISCUSSION

Blunt laryngeal trauma can have immediately life threatening consequences(4) which highlights the importance of sports clinicians having a heightened awareness of this problem. Due to the rarity and complexity of these cases, effective management requires a multidisciplinary approach.

Multidisciplinary approach to management

On field management

Ensuring that on-field medical staff have the appropriate competencies in immediate care in sport is a key element of secondary injury prevention programmes. English Premiership matches medical staff must have completed a minimum of a yearly level three course in Immediate Care in Rugby which includes advanced airway management with training in needle cricothyroidotomy and the surgical airway. The medical staff at English Premiership matches (who are level three trained) are specifically trained in both the recognition and if required advanced airway management in the prehospital setting.

In hospital – conservative versus surgical

The indication, timing, and nature of surgical intervention have been largely dictated based on single centre case series. There is thus great heterogeneity with the surgical approach(4,5). Bent et al(6) reviewed 77 patients with laryngeal trauma and concluded that conservative treatment of Schaefer group 1 and 2 injuries was 100% effective and surgical repair within 48 hours for those requiring surgery improved outcomes.

Our patient was Becker group 2 with no indication for early surgical intervention. The later development of trauma induced EILO necessitated arytenoidectomy. EILO is a cause of exertional breathing difficulties(7). The vast majority of cases are caused by supraglottic closure of the laryngeal inlet(8). It is diagnosed using CLE(3), which allows visualisation of the larynx during incremental bouts of exercise. Treatment options vary greatly by centre and include specialist SLT for laryngeal control, physiotherapy for breathing pattern work and surgery(9). Due to the severity of the EILO and the lack of full symptom resolution with conservative treatment, our patient was deemed to be a candidate for surgery. We believe this to be the first case of trauma induced EILO treated with arytenoidectomy.

Longer-term follow-up

Successful longer-term management of this type of injury is dependent on high quality MDT input. Following arytenoidectomy flow parameters improved but were still attenuated to 66% of predicted values. SLT therefore provided tailored breathing techniques to maximise laryngeal aperture during exercise. Deficits in voice and respiratory function may only develop when exercise intensity increases so it is important that specialist therapy is integrated with physical training sessions.

Our patient began training within six weeks of surgery and this speed of return to sport is similar to the figures seen in a case series of patients that had surgery for EILO(9).

Considerations for safety in rugby

Recent changes to tackle laws in rugby should act to reduce risk of blunt laryngeal trauma. Specifically, in addition to enforcing current rules, World Rugby trialled a new tackle height (the level of the armpit), during the start of the 2018 Championship Cup season and tacklers made contact with the ball carrier's head and neck 30% less often(10).

CONCLUSION

In conclusion, laryngeal trauma is a risk in contact sports such as rugby and more extensive research is needed to evaluate its incidence within the sport. The care of athletes who have sustained such an injury is complex and it is mandatory to have a plan in place to manage the acute in-field event but also the in hospital and multidisciplinary team follow-up rehabilitation phase of recovery. Future work should focus on improving understanding and then minimizing the risk factors underlying traumatic laryngeal injury in all sports, to ensure that these devastating injuries never occur in the field of play.

Authorship

BF: prepared this case report for scientific publication. SK: provided details on the on the field management of rugby injuries. JS: provided specialist speech and language therapy and contributed to the drafting of the manuscript. GM: involved in the acquisition and reporting of the imaging. GS: led the surgical care of the

patient. JH: led in the clinical care of the patient and contributed substantially to the contents of the final version of this manuscript.

Conflict of interest

None declared.

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FIGURE LEGENDS

Figure 1 Tackle sequence (A) Prior to the contact being made (B) Initial contact of left shoulder into neck (C) Shoulder rides up into face (D) Players fall to ground. Link to video of injury - <https://www.youtube.com/watch?v=TodNq3aGFzk>

Figure 2 (A) Axial CT demonstrating a fracture of the left posterior cricoid cartilage (arrow). Note the arytenoid cartilage (*) is interposed between the displaced cartilage fragments (B) Coronal maximum intensity projection (MIP) reconstruction demonstrating the widely separated fracture of the left posterior cricoid cartilage (block arrow) resulting in disruption of the cricoarytenoid joint. Note the normal right cricoarytenoid joint (arrow)

Figure 3. Laryngoscopic appearances on (A, B) day 6 revealing acute haemorrhage (arrow) and oedema similar to findings at presentation, (C) 6 weeks post arytenoidectomy (D) 4 months post arytenoidectomy.

