

Review

Management of facial injuries in elite and professional sports – a consensus report

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Abstract

Whilst there have been great improvements in the management of injuries in elite and professional athletes with the formalisation of the clinical specialty of sports and exercise medicine, the management of facial injuries has perhaps lagged in this group. Professional athletic careers can be put in jeopardy by unnecessarily long absences from training and competition after facial injuries. Professional and elite sports athletes can benefit from different approaches to the management of their facial injuries that reduce time away from competing but maximise their safety. On 6 December 2018, a consensus meeting of interested clinicians involved in the management of facial injuries in this group was held at the Royal Society of Medicine, London, UK to provide a contemporary review of the approaches to conservative, operative, and recovery management. National experts with specialist experience of facial injuries and athletes' needs from a range of elite and professional sports led the day's programme and the discussions so that guidelines could be formulated. These are presented in this review.

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Introduction

The development of medical expertise and the recognition of a sports and exercise specialty have seen interested clinicians from various related areas become more subspecialised and directly involved in the field. However, apart from several notable exceptions, until now, the majority of surgeons treating facial injury have not considered treating elite athletes in any exceptional way. We believe that professional and elite

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Table 1
‘The squeeze test’ in the management of facial injuries in elite sports.

How accessible are you?
Prior to consultation, have you researched the injury mechanism and immediate care provided?
How clear are your lines of communication?
Can you build relationships with the athlete, their team, and other health care professionals in their network?
Can you ignore the media at all times?
Can you provide the total support that the athlete requires through their treatment and recovery journey?

Table 2
Personalised risk assessment.

The sport and the risk of another impact to the injury zone.
The athlete’s position in a team and its particular demands/risks.
The proposed treatment plan - surgical versus non-surgical.
The proposed recovery plan.
Will the level of postoperative pain and swelling affect performance and the athlete’s safety?
Is the athlete currently involved in a championship situation?
In potentially longer periods of convalescence, will other injuries or technical issues benefit from management at the same time.

sports athletes with facial injuries benefit from approaches that are different from those used in the general population.

Currently in the United Kingdom, there is no consensus on the timescale for the return to play for elite sports athletes with facial injuries.^{1,2} Therefore, in December 2018 a panel of experts in the field convened with the aim of providing a consensus guide on management and time of return to play for these athletes.

The individualised approach to injuries in the professional athlete

Practice in elite sports medicine has some differences from that in routine clinical practice. The specialist clinician must be available out of hours or have made arrangements for suitably competent cover, must maintain clear lines of communication, and not be ‘star struck’. A clear understanding of the type of injury and its cause, and the impact of any clinical intervention for that athlete in that sport, in that phase of training, and at that part of the club and international and Olympic cycle, is key (Table 1).

Different sports naturally present a range of frequency and type of impact to the craniomaxillofacial skeleton and soft tissues. Indeed, different positions or roles in the same sport can vary in their relative risks. There is no ‘standard practice’ or blanket guidance on facial injuries in all athletes. Therefore, when considering an answer to the question: “How soon can I return to play?” a personalised risk assessment should be undertaken (Table 2). A detailed discussion with the team’s sports and exercise medic (SEM) about the athlete should be undertaken, and should include the background, timing in the competitive cycle, and other medical concerns,

which may benefit from the opportunity to be managed in parallel if any recovery period is obligatory.

There may also be occasions when the player’s wishes are different from those of the team’s medics. Occasionally the player wants more, not less, recovery time. In this situation, it is worthwhile exploring their reasons for this delay, and in most cases their wishes must be respected. In general, the return to fitness training can usually start as soon as the player recovers from the effects of the anaesthetic drugs, usually by three days.

Facial fracture healing

In parallel with orthopaedic fracture management, maxillofacial fractures are usually managed using direct osteosynthesis techniques of direct plate and screw fixation to bone. This has been shown to facilitate direct bony healing by the ingrowth of bone into the immobilised fracture site without the need for cartilaginous callus formation, and has been demonstrated to facilitate better reduction, early healing, and early restoration of normal function.³ Simple fractures of load-bearing bone such as the mandible, will routinely be managed with the use of load-sharing plates in which the structural integrity of the basal bone bears some of the load across the fracture site, and micromovements across the site encourage good healing – typically in four to six weeks. However, rigid fixation can delay healing and thus is typically reserved for unfavourable conditions such as comminuted or non-healing fractures.⁴

Occasionally a player may hit a piece of equipment, such as a goalpost or ski, or be hit by an animal’s hoof or another player’s body part such as a knee. There may not be any visible damage, but never forget the possibility of intracranial haemorrhage.

Mandibular fractures

In the United Kingdom over the past five years there have been a number of fractured mandibles in high-profile professional athletes. The type of fracture pattern, the treatment provided, and the type of sport are essential aspects to consider. For example, the return to competition time for a field sports player with an isolated fracture of the mandibular angle will be different from that of a professional boxer for whom the jaw is a primary impact zone. The importance of the personalised risk assessment is vital, and there should be low tolerance of open reduction and internal fixation (ORIF) of the fracture site as soon as possible following injury. In sports such as football and rugby, the return to play at an elite level following ORIF can be as early as one to two weeks for an isolated fracture, but multiple fractures may require a longer period. The caveat in all cases is pain control, the player’s safety, and an appropriate risk assessment. Evidence-based guidance is challenging to provide at present.

Combat sports fall outside this advice, and currently the British Boxing Board of Control (BBBoC) recommends that all boxing competition licences are suspended for a minimum of 28 days for all boxers with fractures of the facial skeleton. This timescale can increase to 45 or 90 days and is based on a strict risk assessment and ongoing clinical reassessment of each case. The BBBoC does have an advantage in that the vast majority of boxers do not compete every week.

Consensus was that in common with the non-elite sporting community, mandibular fractures should be managed as soon as possible after injury – typically within 24 hours, and that miniplate load-sharing fixation was appropriate. On occasions, some surgeons might utilise inferiorly positioned load-bearing plates in contact sports athletes, but there is little scientific basis for this, and it has raised the possible need for plates to be removed in the future to prevent stress shielding. The return to training and sport has probably been the most contentious point in this area. It was felt that the typical reflex response of the need for three months' abstinence from contact sports, which was advised by some surgeons, was not to be recommended, and that a return to training and competition could be undertaken far more quickly. However, the need for close clinical review by the operating surgeons, communication with the sports medical team, and a personalised approach are essential.

Dental injuries and preventative dental care

The American Dental Association estimates that up to 200,000 injuries are prevented annually among high school and collegiate athletes by wearing mouth guards.⁵ Their use is now mandatory, or at least recommended, in many sports including ice hockey, hockey, boxing, martial arts, rugby, volley ball, and wrestling.⁵

The authors strongly advocate that all athletes attend a general dental practitioner (GDP) regularly. Some elite athletes neglect dental hygiene and consequently suffer acute dental abscesses, which interfere with training or even major sporting events. Formalised access to oral care has, in more recent years, become essential for athletes given their altered diet, often requiring regular food and fluid intake, along with the advent of sports energy drinks, isotonic drinks, and flavoured waters, and their relation to tooth wear and dental caries.⁶ It also allows for the production of custom mouth guards, the saving of records of the dentition, the management of acute injury or dental problems, diet advice, and the provision of definitive treatment should it be required. The authors also suggest that athletes who have a higher chance of dental trauma should have study models (for help with reconstruction planning) and vacuum-formed retainers (to use as immediate splints or as stability devices) to help with rehabilitation if trauma occurs.

Maxillary fractures

Maxillary fractures are not really considered part of sports trauma, and typically they are caused by blunt moderate force through interpersonal assaults, falls, and road traffic accidents. As such they were not felt to be part of the discussion of sports injuries and would, in any case, warrant a more significant period of convalescence than other facial injuries.

Isolated orbital floor and medial wall fractures

These are common, as the force that is created by any impact and the intense momentary pressure on the globe is dissipated by immediate fracture of the thin orbital walls adjacent to the air sinuses, specifically the medial wall and floor.

The management of these orbital fractures in elite athletes is similar to that in the general population, but with some important considerations. The diagnostic phase requires cross-sectional imaging and orthoptist assessment. It is important to remember that not all orbital fractures require surgery. A small linear fracture with little loss of bone and a full range of eye movements will probably not need surgery, but the patient will always need advice about avoiding nose-blowing and any other habits that might produce surgical emphysema.

Surgical intervention can be considered at the earliest opportunity following the resolution of eyelid oedema to facilitate a safe orbital approach. The time to surgery will inevitably vary depending on soft-tissue swelling, but with the judicious use of ice packs, and by adopting a head-up posture when sleeping, it may be possible to operate within the first 48 hours. The choice of reconstruction material will depend on the anatomy and extent of the fracture according to established principles. A postoperative computed tomogram (CT) is indicated if titanium reconstruction has been used, to ensure correct placement of the implant.

Postoperative aftercare and advice are crucial. The key factor in the return to sports following repair of an orbital fracture is that the athlete is diplopia-free and has unobscured visual fields. Close liaison between the orthoptist and surgeon is therefore essential. The distribution and severity of any residual diplopia will need to be assessed on a case-by-case basis, which will influence the return to active competition. The experienced multidisciplinary team will also be able to prognosticate as to the length of time that full recovery will take, or to warn the athlete and management team if a full recovery is unlikely.

A return to full contact training and competition in ball sports will probably be appropriate at three weeks; for full-contact sports, the use of protective headgear or a facial shield would be advisable for six weeks. However, the convalescent period will need to be longer if the face is a focused target zone during competition (for example, boxing, and martial arts). As already discussed, the BBBoC's recommendations of competition suspension for a minimum of 28

days should apply. After that, reassessment should steer the ongoing advice.

The advent of bespoke and ‘off-the-shelf’ orbital reconstruction with rigid titanium plates may mean that the pressure from subsequent impacts to the globe cannot be dissipated, but we are not aware of any cases in which the globe itself has been damaged by this orbital repair.

Zygomatic fractures

Guidance on zygomatic complex fractures is complex and depends on the fracture pattern, the treatment received, and the nature of the sport. Decisions about a return to training will follow orbital management, with an early return to aerobic exercise in the form of cycle training at 72 hours, and a graduated return to full exercise after that. All surgical approaches (via a temple incision, mouth, and/or lower eyelid) are likely to have healed at two weeks, and can be considered non-vulnerable to reopening or contamination at three weeks. A simple elevation can be considered as robust at four weeks; if fixed with miniplates then robust at three weeks. If there is severe comminution at one or two fixation points, then the time to return to full contact should be delayed to six weeks.

If the nature of the injury means that it is suitable for elevation of the fractured zygomatic bone without fixation, the athlete can return to training after two days, with a full return to contact sports at three weeks. If ORIF has been performed, then training can commence at three days postoperatively with a return to play at seven days. If the surgical intervention is followed by protection with a customised facemask, then a return to play can be achieved within three days.

The advent of customised facemasks for elite athletes has meant that facial fractures are no longer deemed participation-preventing injuries, and players can now play during the acute recovery period.⁶ It must be stressed that the use of protective masks in full sporting action must be approved by the respective sport’s governing body.

As in all the injuries discussed, these are approximate recovery periods, and the ongoing review and advice of the operating surgeon should be adhered to.

Nasal injuries

Nasal fractures are some of the commonest injuries. If they can be manipulated immediately (with or without local anaesthesia, or at least as soon as the game or contest is over, and before swelling occurs) this will ensure the most rapid return to play, probably with facemask protection, and the least invasive treatment.

The immediate concern with nasal injuries is to exclude septal haematoma. If undiagnosed, a septal haematoma will result in necrosis of the cartilage and collapse of the nasal architecture. This can have a dramatic effect on nasal airflow

and could affect performance. The perceived effect of poor nasal airflow on performance has been well documented in the media by professional boxers.

As with all fractures of the facial skeleton a clear approach and plan are required. The nasal structure cannot be comprehensively evaluated until the swelling has reduced. If the nasal passages are not patent and there are concerns that airflow will have an impact on performance, then ‘holding operations’ should be considered with definitive nasal surgery at the end of the athlete’s career. These so-called ‘holding operations’ may be as simple as the manipulation of the nasal bones or septum, but in the case of acute traumatic saddle-nose deformity the surgery required may be more extensive. The sole aim is to ensure that the nasal airway and surrounding architecture can be made safe with no long-term detriment to the athlete. With regards to the time to return to play, the use of customised facemasks has allowed athletes to return almost immediately. This has been shown at the highest level in the National Basketball Association with athletes such as Kobe Bryant and LeBron James using facemasks for protection and playing immediately after nasal fractures.⁷

Soft-tissue facial injuries

Elite athletes will often wish to continue playing or competing with a laceration, but no regulatory body will allow the competitor to continue with an exposed, bleeding wound. If this is a simple laceration the on-site medics will need to deal with it rapidly. The competitor will often be hot and sweating, and the wound may be dirty. Immediate cleaning may be followed by bandaging, or more temporising methods to close it with glue, or rapid continuous surface or subcuticular suturing, always bearing in mind that this may have to be replaced later with more accurate suturing.

Facial soft-tissue injuries are managed by clinicians from many varied medical backgrounds and specialties and it is vitally important that the attending clinician is realistic about their own level of expertise. Many soft-tissue injuries are amenable to simple management, but the keenness of a pitch-side medic to help there and then may obscure the need for a better long-term outcome. It is important to establish a network of interested specialists locally, regionally, and nationally, who can be referred to for advice or can deal with any problem.

One should have a plan, not just for home games, but also for away games should any treatment be necessary. Dropping into the local accident and emergency department (A&E) may well be satisfactory, but may not be the optimal care pathway for an athlete.

It is important from the start to consider how one’s practice, consultation area, and procedure area are set up at the training ground and match-day stadium. If the intention is to undertake procedures (no matter how simple) on site at any of these locations, it is important to ensure that there is access to a clean, uncluttered facility. A dedicated medical room

should be available in all clubs,³ and careful consideration and planning should be given to its set up.

Appropriate ventilation and storage areas for equipment are essential, as well as deciding where electrical sockets should be. Will there be a need for suction, air, or oxygen cylinders?

Ventilation for a small procedure for either a clean contaminated wound, or a contaminated wound, will be acceptable in a room that has a window, but it must be covered by a mesh to prevent insects from flying in.

Disposable instruments are a cost-effective resource for minor procedures. They come in ready-made packs and can be customised to one's needs. Costs are always looked at, but the instruments used should be of sufficient quality for the purpose, even if slightly more expensive. Provision should be made for the safe disposal of sharps, and a small fridge will be needed to store local anaesthetic and the medicines one may wish to use.

The assessment or treatment couch will need to be appropriate for the work being undertaken, taking into account the size and layout of the room. Elite sports athletes can be both able and less ably bodied, and these considerations have to be factored in, especially in multi-sport and multi-team use facilities. Proper surgical overhead lights and headlights should also be available.

The types of soft tissue injury that commonly occur are lacerations, contusions, haematomas, and abrasions or burns. With facial soft-tissue injuries, it goes without saying that a head injury assessment is mandated alongside any assessment of these injuries. If filmed replays are available to help with this, they should be used. Assuming there is no associated brain injury then the wound should be systematically assessed.

Formal assessment is needed of the skin, underlying soft tissue, important underlying structures, and bone, to find out if the wounds communicate between organs or structures. Has there been significant tissue loss or loss of function? A good anatomical knowledge is paramount to be able to identify damage to key structures such as motor and sensory nerve branches, the parotid duct, globe, orbit, and to the facial/ocular/oral muscles. If possible, it is best to examine the extent of the damage, tissue loss, and function in an environment away from the pitch, and this should be combined with irrigation and good wound toilet.

The key decisions to make at this point are:

- Can this injury be definitively treated now?
- Can this injury be patched up to allow the athlete to continue and consider definitive treatment afterwards?
- Does the athlete need to be withdrawn from action?

An example of a soft-tissue injury for which treatment can be delayed is a pinna haematoma. The area can be banded and protected and the player can return to action. The haematoma can then be properly treated after the game with

drainage, and sutured appropriately in splints to prevent re-accumulation.

A lip split that has gone through all the layers to the mucosa requires the player to be withdrawn. It needs to be sutured properly using multilayered closure with accurate anatomical approximation to deal with the mucosa, deep and superficial orbicularis layers of muscle, soft tissue, and skin, to give the best functional and cosmetic result. The functional and cosmetic results of such injuries are not to be underestimated, as many of these athletes go on to have a media career after professional sport, and a poor result could adversely affect their future opportunities.

Wound closure materials, dressings, splints, adjuncts, and antimicrobials all need to be considered. For quick closure of a scalp wound to get a player back on the pitch, the use of staples is a consideration. Aside from that, absorbable and non-absorbable sutures, with or without antimicrobial impregnation, glue, suture strips, silicones, alginates, hydrocolloids, wound balancing matrices, antimicrobials, ointments, and even vacuum-assisted closure devices (VAC) (be they for closed surgical wounds or open wounds) should be in a clinician's arsenal or at least considered for application in the right cases.

The wound should be closely monitored and managed in accordance with its severity. Clinical signs, pre-existing conditions, and the health of the athlete must also be considered.

The tetanus status of the athlete should be known, and any tetanus-prone wounds need administration of immunoglobulin.

Return to sport

A return to elite sporting activity during the early recovery period can increase the risk of re-fracture and wound opening, and decrease performance due to injury anxiety.⁸ However, any period away from full training and competition can be financially costly to the athlete through the loss of condition and the likelihood of further injury, but also through loss of their place in the team. In addition to an athlete's desire to return to full activity, in some instances there may be pressures from external factors - people who are involved financially with the sport and have a vested interest in the athlete's return.

A timetable for a return to action, alongside any rehabilitation that may be required, should be drawn up. Specifically, if the athlete cannot play or train at full capacity, ask:

- What can the athlete do?
- What other injuries are they carrying/managing for which they could now undergo treatment or rehabilitation in parallel? This may be a key decision so that time off is not dead time.

Conclusions

The treatment of facial injuries in elite athletes forms a complex practice with many considerations. Given the wide range of sports and potential injury patterns in the facial skeleton and soft tissues, the authors feel that a strict didactic protocol approach is not appropriate. At this stage guidance is based on experience. However, to proceed with an evidence-based approach, prospective data collection on all such facial injuries in the United Kingdom is required. This was the outcome of discussions at the meeting and should include the type of injury, nature of the sport and role in that sport, and the background medical, physical, and mental health status. It should also include other injuries, the investigations, treatment plan, recovery plan, duration from injury to return to non-impact training, duration from injury to full competitive action, and finally, any complications encountered. Ultimately this will lead to an evidence-based guide for the treatment of facial injuries in elite sports, which can be used in conjunction with the described personalised risk assessment for each athlete.

However, before this, a more structured network should be established between like-minded clinicians who are working in this field, with better communication and more regular meetings. Finally, the role of the specialist SEM and the treating specialist's regular clinical review of the injured athlete should override any generic prescription of absence from competitive practice.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Not required.

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