Elbow Injuries in the Austere Environment

36

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The function of the elbow joint is to position the hand in space in order for it to perform its tactile and grasping functions. To perform each function well, it requires a good range of flexion, extension, pronation and supination, reasonable comfort, strength and stability.

The elbow joint comprises of three closely related individual articulations. The humeroulnar joint between the articulations of the olecranon process of the ulnar and the trochlea of the distal humerus is essentially a hinged joint allowing a free range of flexion extension. A small amount (5–10°) of abduction/adduction and pronation/supination takes place at this articulation between extension and flexion. The radiocapitellar joint between the concave surface of the proximal radius and the convex surface of the capitellum on the lateral portion of the distal humerus allows the radius to pronate and supinate with a changing centre of rotation from elbow flexion to extension.

In combination with the medial collateral ligament, it provides a significant contribution to stability against valgus forces. Most studies suggest that the radius transmits over 50 % of the compressive force of the forearm. The proximal radioulnar joint is an articulation between the cylindrical portion of the radial head and the concave cylindrical facet on the lateral surface of the coronoid process. Stability to this joint is provided by the annular ligament. The proximal radioulnar joint is part of the general articulation in the forearm between the radius and ulna with stability for the overall complex being provided by the interosseous ligament of the forearm and the distal radioulnar joint.

The main motors that move the elbow joint along with their nerve supply are located some distance away from the joint and rarely directly involved in elbow trauma. However, the main flexor and extensor muscles of the wrist and hand and pronators and supinators of the forearm have their origins close to the elbow joint, many of them crossing the joint. In addition the nervous and arterial supply of the forearm, wrist and hand pass in close proximity to the elbow joint and can be damaged by elbow trauma.

The articular surfaces of the overall elbow joint make it a fairly constrained joint, well able to resist loads placed across it through a wide range of positions. This degree of constraint contributes to the tendency for the elbow to develop stiffness following trauma and subsequent immobilisation.

The fully functioning upper limb undoubtedly requires a mobile, comfortable, strong and stable elbow. Many basic activities of daily living require the hand to be able to reach both ends of the

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Table 36.1 Elbow function required for different activities

	Activities of daily living (mouth, perineal hygiene)	Non-manual job	Light manual job (driving, machine operator)	Heavy manual job (agriculture, construction)
Motion	+++	+	++	++
Comfort	+	+	++	+++
Strength/stability	+	+	++	+++
Intact hand neurovascular function	+++	++	++	+++

Key:
+ desirable
++ useful
+++ essential

gastrointestinal tract thereby requiring almost a full range of flexion and extension (Table 36.1). Loss of elbow motion means that the limb tends to become the assisting limb being used to support, stabilise or carry in order to help the other normal limb being the prime performer of these tasks. A rather stiff, comfortable elbow still allows that limb to contribute to overall function.

The most disabling elbow is an unstable "flail" that can be seen following an un-united fracture. In this type of scenario, the other good limb has to be used to position the hand of the bad limb in space. Whilst the goal of elbow trauma management is to preserve as much function as possible, realistic goals should be set giving consideration to the status of the other upper limb and the lower limbs as it must not be forgotten that the injured limb may be required for weight-bearing purposes.

In a heavy manual worker with a normal other limb, it may be better to go for strength and stability at the expense of some motion, particularly if the injured elbow is in the non-dominant arm. The table attempts to summarise the balance of motion, pain, strength and stability required in different types of tasks and further emphasises the importance of preserving hand function.

36.1 Basic Principles and Management

These principles apply mainly in the situation of acute trauma and should be considered in the context of the patient's pre-injury status, health status, occupation, social needs and any other injuries sustained in the accident.

1. Ensure that airway, breathing and circulation are all secured and stabilised [1].
2. Ensure vascularity of hand.
3. Consider associated neurological injuries.
4. Open wound management.
5. Joint reduction and primary skeletal stabilisation.
6. Definitive management.
7. Rehabilitation including where possible, early motion.

All of the above represent a logical order of priorities. It should not be regarded as a rigid, chronological order of management. A full, well-documented initial assessment allows construction of a logical management plan aiming for realistic, long-term goals. In an austere environment, full consideration will have to be given to expertise and resources available. The primary focus will be on limb preservation and reducing the risk of long-term complications such as infection or impaired distal neurovascular function.

Primary management, including preservation of life and limb and initial wound management, will have to be performed as soon as possible. Definitive management will be able to wait allowing possible patient transfer to the required expertise and resource. Ideally, the acute management will be planned with full awareness and understanding of likely definitive management to avoid early decisions being made that compromise subsequent management and the final outcome.

36.1.1 Advanced Trauma Life Support

In all patients with acute elbow trauma, consideration should be given to the presence of other injuries [1]. This is more likely with a high-energy mechanism of injury. A primary survey to identify life-threatening conditions should be performed simultaneously. Initial focus is on A (airway maintenance with cervical spine control), B (breathing and ventilation), and C (circulation with haemorrhage control). Only once it is satisfied that the elbow trauma is the dominant problem should attention focus on the elbow injury. On very rare occasions such as a partial amputation, the elbow injury may be the source of life-threatening haemorrhage. In an austere environment, emergency amputation may be the only therapeutic option available to save life.

36.1.2 Distal Vascular Status

The brachial artery lies close to the anterior aspect of the distal humerus and elbow joint, meaning elbow trauma can cause distal vascular compromise which is most likely with severely displaced supracondylar fractures or penetrating trauma [2]. An open injury with a history of significant bleeding and distal vascular compromise should raise a high index of suspicion of vascular injury. If the patient is stable and the limb cold and pulseless, this would be an indication for vascular exploration if resources for repair are available. In a closed injury with a pulseless hand, the risk of a severed artery is much less, the vascular compromise being more likely to be due to kinking of an artery over a displaced bony fragment.

In this situation with a pulseless hand, if the hand is cold with poor capillary filling, reduction of the bones into good alignment is an emergency (see supracondylar fracture section). If this restores good capillary filling and warmth to the hand though the radial pulse is still absent, there is good evidence that the hand will survive and that acute vascular exploration is not required. Where there has been a period of vascular compromise, a high index of suspicion of the development of forearm compartment syndrome should be present and, if suspected, fasciotomy performed.

36.1.3 Distal Neurological Compromise

All three major nerves that cross the elbow joint (ulnar, median and radial) are at some risk in elbow trauma [3]. Distal neurological function should be documented. That is an indication for reduction of joint or bony displacement as soon as possible. In an austere environment, exploration of the nerves is not always advisable.

36.1.4 Open Wound Management

The presence of an open wound should be documented and the wound cleaned and covered with an antiseptic dressing. Broad-spectrum antibiotics should be administered intravenously. The basic principle of open wound management in addition to antibiotics is early wound debridement and lavage, ideally within 12 h (Fig. 36.1). If delayed beyond 12 h, the risk of deep infection increases. The more severe and contaminated the wound, the more urgent the formal debridement. At the time of wound debridement, the primary skeletal stabilisation should be secured.

36.1.5 Joint Reduction/Primary Bony Stabilisation

In the presence of distal neurovascular compromise or an open wound, this should be provided with urgency. In the absence of distal neurovascular compromise with a closed injury, joint reduction and primary stabilisation may well be the definitive management of the injury. Useful methods of primary stabilisation include longitudinal traction, splintage with either a cast or sling or in extreme circumstances, if available, external fixation.

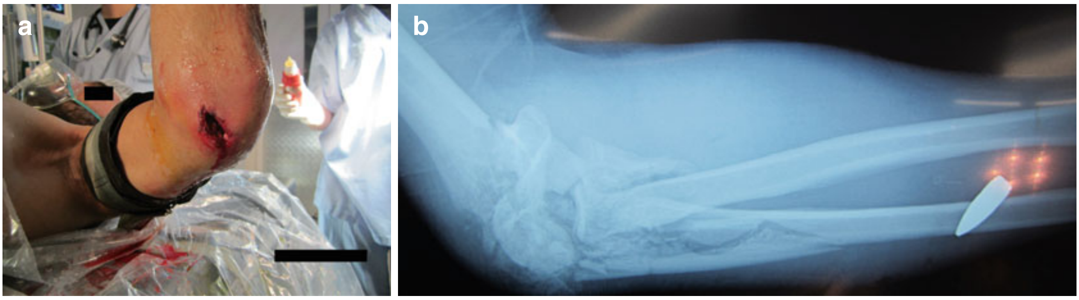

Fig. 36.1 (**a**) Gunshot wound to elbow causing an open very comminuted fracture to elbow (**b**)

36.1.6 Definitive Management

The goal of definitive management is to restore anatomy and provide enough stability to allow early motion. Relatively conservative methods of closed reduction and then a short period of immobilisation in a plaster of Paris cast remains a safe method of treatment with predictable results for many types of elbow trauma. Where it is not possible to achieve good bony reduction via closed methods, operative treatment should be considered depending on the available expertise and resource.

36.1.7 Early Motion

Given the importance of a good range of elbow motion to overall upper limb function, prolonged periods of immobilisation post-injury should be avoided where possible, but this is always a balanced judgement taking into consideration factors such as realistic goals for the injury, the risk of loss of joint or fracture reduction and access to supervised rehabilitation and likely patient compliance.

36.2 Surgical Approaches

Treating elbow trauma in an austere environment requires a sound anatomical knowledge and, in particular, a full understanding of the path of the three main nerves (median, ulnar and radial/posterior interosseous) and brachial artery as they cross the elbow region [4]. The author would not recommend attempting elbow surgery without this knowledge which is beyond the scope of this chapter.

Structures most at risk in surgical approaches to the elbow are the ulnar and radial/posterior interosseous nerves. The ulnar nerve is most at risk in the cubital tunnel passing very close to the medial capsule of the elbow joint. The author would recommend identifying it early in the surgical exposure performing a limited gentle mobilisation and, if felt necessary, widening the tunnel between the two heads of the flexor carpi-ulnaris muscle. Regular checking its location during the surgical procedure is recommended. Routine anterior transposition is usually not necessary. The radial nerve is vulnerable to over enthusiastic retraction for approximately 10 cm above the elbow joint to where it passes from medial to lateral just below the midpoint of the humerus. The posterior interosseous nerve is at risk in lateral approaches beyond three fingers breadths distal to the lateral joint line and lies close to the anterior capsule.

When planning a surgical approach, it is important to appreciate the likely degree of exposure required and whether triceps may need to be lengthened. Most elbow trauma can be dealt with using either variations of the posterior approach or a lateral approach.

The posterior approach is the most versatile for elbow trauma, a triceps splitting variation being used for extra-articular distal humeral fractures and open reduction of elbow dislocations. The better exposure of the articular surfaces offered by an olecranon osteotomy makes it the approach of choice for intra-articular fractures. The author favours the patient being positioned laterally with the arm over a support such as an ether screen so that it hangs free at 90°. The use of a tourniquet is recommended.

The initial incision is longitudinal, centred on the olecranon. It should not pass directly over the olecranon. Curving to the radial side of the joint ensures good vascularity to the medial flap. The skin incision is deepened through the superficial fascia and then flaps reflected out to the medial and lateral condyles. The ulnar nerve should be identified. Although there are many modifications of triceps splitting or reflecting deep exposures, a distally based 'V' is simple and can be extended down either side of the olecranon. When treating a chronic dislocation, this also allows to lengthen triceps by closing in a 'V' to 'Y' fashion.

When treating an intra-articular fracture, after the superficial dissection, the author would recommend performing a Chevron osteotomy of the olecranon, having pre-drilled a hole for subsequent fixation using a partially threaded cancellous screw if necessary supplemented by a figure of eight tension bands. The Chevron should be performed with a fine sawblade, sawing through 90 % of the bone before completing the osteotomy with an osteotome. The proximal olecranon can be retracted proximally with the whole triceps to offer excellent exposure to the whole of the distal humerus.

The lateral approach allows good exposure of the lateral condyle, including shear fractures of the anterior capitellum, and is the exposure of choice for radial head fractures and delayed radial head excision. This approach is best performed with the patient supine with the arm on an arm table, the elbow flexed approximately 70° and the forearm pronated. Again, a tourniquet is recommended. An incision approximately 10 cm long is centred on the lateral joint line.

After superficial dissection, the exposure is between triceps and anconeus posteriorly and brachial radialis and extensor carpi radialis anteriorly. The extensor origin can be elevated off the humerus to allow wide exposure of the lateral portion of the joint. The posterior interosseous nerve is at risk during dissection of the proximal radius beyond three finger breadths below the lateral condyle. This risk can be reduced by ensuring that the forearm is pronated.

36.3 Elbow Dislocations

Elbow dislocations occur in both children and adults, in children usually in later childhood/adolescence. Posterior and posterolateral directions of dislocation are the most common, the usual mechanism being a fall onto the outstretched hand often with a valgus and external rotation force. This mechanism of injury damages the medial collateral ligament complex which is the key to elbow joint stability. A clinical diagnosis is usually fairly straightforward with obvious deformity, loss of the normal triangle between the two condyles and the olecranon. The elbow is usually in an extended posture. Neurovascular complications are very rare. The diagnosis should be confirmed by plain x-rays looking carefully to identify any associated fractures (Fig. 36.2).

Closed reduction, either under sedation or general anaesthetic, should be performed using hyper-supination and longitudinal trac-

Fig. 36.2 Elbow dislocation

tion. The main obstacle to reduction is muscle spasm. If the reduction is felt to be stable, immobilisation in a plaster of Paris backslab in a mid-pronated position for 1 week is recommended. If the reduction is felt to be unstable, then immobilisation for 3 weeks is recommended. Immobilisation longer than 4 weeks has been shown to increase risks of long-term stiffness and is not recommended. It may take patients up to 6 months to reach an end point of recovery. Long-term studies have shown an average loss of 12° of extension at 2 years post dislocation. More serious, long-term problems such as chronic instability are uncommon.

In an austere environment, unfortunately not all elbow dislocations present acutely. Chronic elbow dislocation rarely seen in the western world is commonly seen in the austere environment. Beyond 1 week post-injury, the chances of a successful closed reduction begin to diminish, and certainly beyond 3 weeks post-injury, there is a fair likelihood that closed reduction will not be successful and that open reduction should be considered (Fig. 36.3). Most patients with a chronic posterior dislocation have very poor elbow function.

Although the acute pain usually settles, the elbow becomes stiff in the extended posture. There is an extensive literature describing very satisfactory results from open reduction of chronic elbow dislocations [5–8]. These four papers cover a total of 175 patients aged from 6 to 76 with durations of dislocation ranging from 1 week to 24 months with a preoperative range of movement of approximately 35° from the extended position. With a less than 3-month duration of dislocation, a lateral excision allowed satisfactory exposure, clearance of scar tissue and reduction of the joint. Beyond 3 months post-injury, a V to Y triceps splitting approach was required. If the elbow was stable once reduced, immobilisation for 3 weeks in a cast was recommended. If unstable, temporary transfixion with a thick K-wire for a period of 2–3 weeks is recommended. Post-operatively, patients regained a very functional range of movement of typically 35–115° with a low risk of complications. The findings of these papers are summarised in Fig. 36.4.

Fig. 36.3 Chronic dislocation presenting 6 weeks late

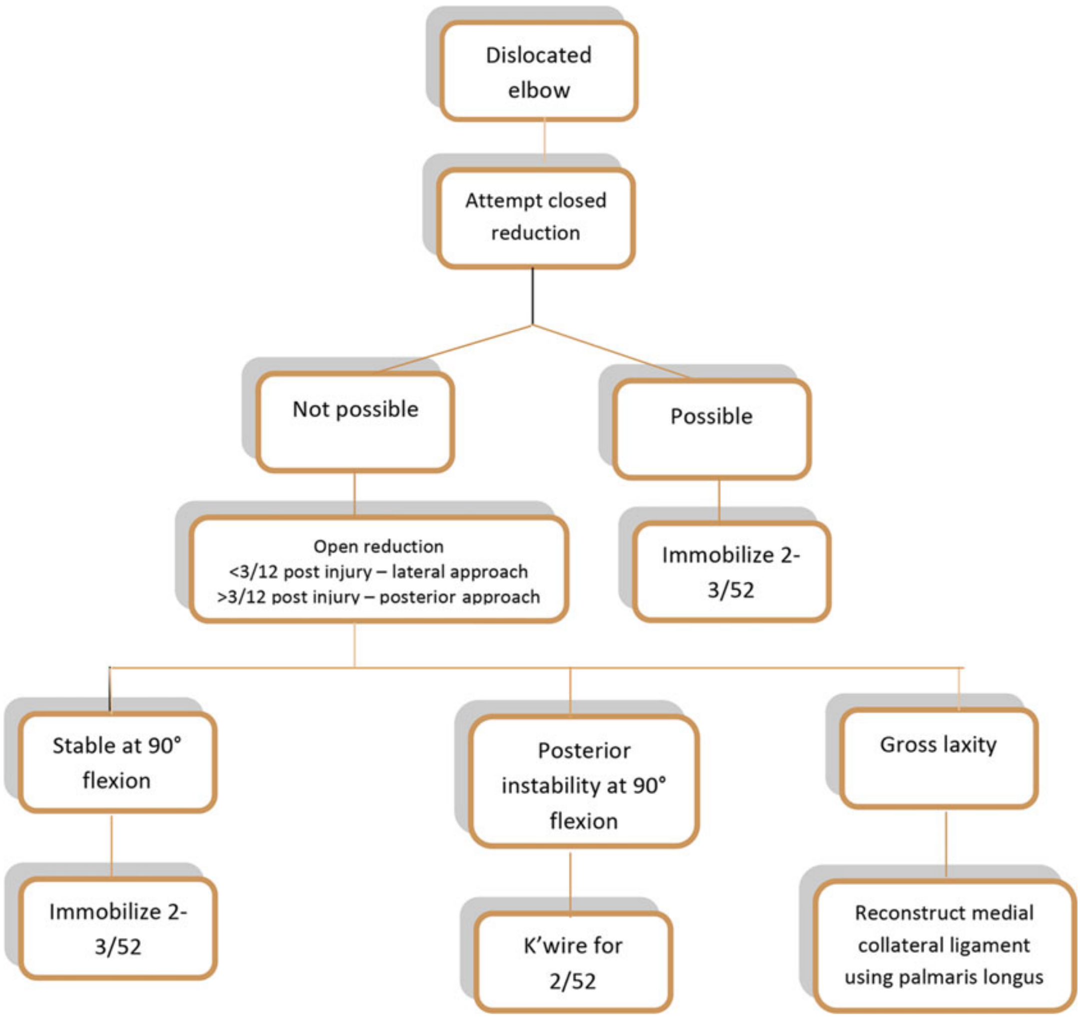

Fig. 36.4 Evidence-based recommendations for elbow dislocation management

36.4 Distal Humeral Fractures in Paediatrics

Supracondylar fractures of the distal humerus are the most common elbow fractures in children. They most commonly occur between the ages of four and ten due to a fall on the outstretched hand with a hyperextension force, often with a varus/valgus and rotational element. As a result, 95 % are posteriorly displaced. They have the potential for vascular compromise which if not dealt with urgently can result in serious long-term impairment of upper limb function.

There is an extensive body of evidence regarding management though much of this is from individual case studies or comparative trials with small numbers of patients. The evidence is best summarised by the American Academy of Orthopaedic Surgeons' new Paediatric Supracondylar Humerus Fracture Clinical Practice Guidelines published in 2011 [9].

Recommendations worthy of note are as follows:

1. We suggest non-surgical immobilisation of the injured limb for patients with acute Gartland type I fractures.
2. We suggest closed reduction with pin fixation for patients with displaced Gartland II and III fractures.
3. We are unable to recommend for or against a time threshold for reduction of displaced supracondylar fractures of the humerus without neurovascular injury.
4. In the absence of reliable evidence, the opinion of the work group is that closed reduction of displaced paediatric supracondylar humerus fractures be performed in patients with decreased perfusion of the hand.
5. In the absence of reliable evidence, the opinion of the work group is that open exploration of the antecubital fossa be performed in patients who have absent wrist pulses and are under perfused after reduction and pinning of displaced paediatric supracondylar humerus fractures. They were unable to make recommendations regarding exploration of the antecubital fossa with absent wrist pulses and a well-perfused hand.

The most widely accepted classification system for children's supracondylar fractures is that of Gartland.

- Gartland I undisplaced fractures
- Gartland II displacement though still some bony contact
- Gartland III complete displacement

When presenting acutely, the pain and deformity usually make the diagnosis simple. It is vital to assess for capillary filling in the hand, presence of the radial pulse and neurological status. Vascular compromise makes fracture reduction an emergency. Plain x-rays will reveal the degree of displacement.

Gartland type I fractures do well with conservative management consisting of a splint and sling for 2–3 weeks. Treatment options for Gartland type II and III fractures will depend upon the resources available. They range through blind reduction and cast immobilisation, reduction under X-ray control and either cast immobilisation or percutaneous pinning. An alternative to operative intervention is elevated straight arm traction as a means of definitive management.

The technique for closed reduction of supracondylar fractures remains best described by John Charnley in his book "The Closed Treatment of Common Fractures" [10]. He stresses the importance of focusing on the attached soft tissues, namely, the triceps muscle and posterior periosteum. These can be kept tight by longitudinal traction in the axis of the arm to draw the distal fragment into a reduced position. With the elbow still in a position of extension and then after a pause to allow correction of the extension component of the deformity, it is then possible to correct any lateral displacement and rotation before flexing the elbow, now applying traction in the axis of the forearm to lock the fragments in position.

In the absence of X-ray facilities in the operating theatre, a plaster of Paris backslab should be applied. This has been shown to give very reasonable results for Gartland type II fractures [11]. The results are much better for Gartland type II fractures with 64 % good-excellent results compared with Gartland type II fractures where 47 % of patients achieved a good-excellent result. If there is an image intensifier present in the operating theatre, the results are improved by inserting percutaneous K-wires to stabilize the fracture reduction [12]. Closed reduction and long-arm slab stabilization showed 68 % good-excellent results, while closed reduction and percutaneous K-wire fixation showed 87 % good-excellent results (Fig. 36.5).

The most challenging situation in the management of supracondylar fractures in children is the presence of vascular compromise. Cold pulseless hand is an indication for emergency reduction of the fracture. In most cases, fracture reduction allows a good recovery of circulation. However, in the operating theatre with the fracture reduced, there may still be concerns regarding the vascularity of the hand.

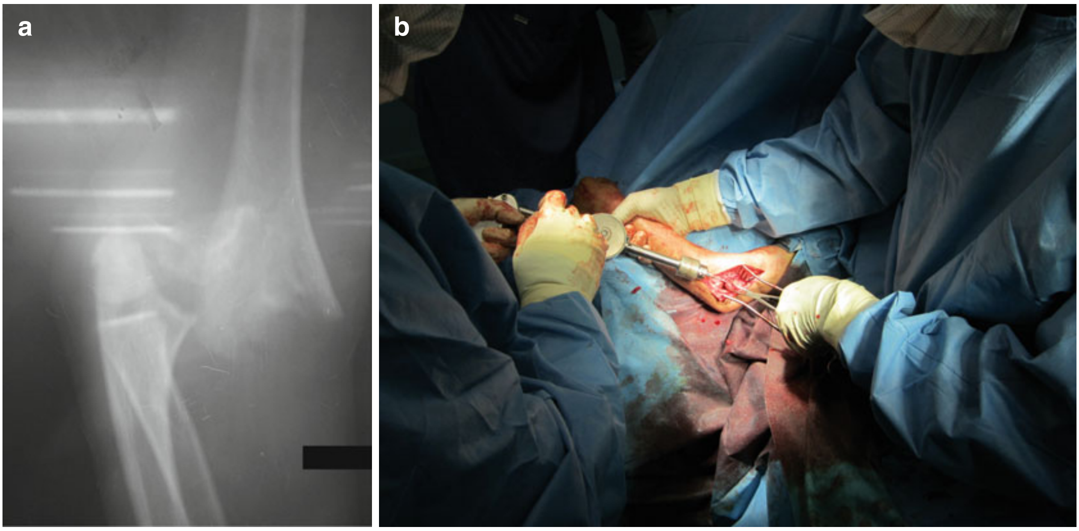

Fig 36.5 (**a**) Gartland III supracondylar fracture and (**b**) open reduction and K-wire fixation of a neglected supracondylar fracture

This may be due to elbow flexion in the presence of significant soft tissue swelling causing external compression on the brachial artery or, more rarely, actual damage to the artery by the initial injury.

Absence of a radial pulse in the presence of a well-perfused hand post-reduction can be managed conservatively without vascular exploration [13]. In this series, the radial pulse returned by 6-week follow-up with no long-term dysfunction. Surgical exploration should be recommended only if there is either severe pain in the forearm persisting for more than 12 h after the injury or if there are signs of deteriorating neurological function. This would require the presence of a surgeon competent in vascular reconstructive surgery and would often have to be combined by a fasciotomy of the forearm muscles.

In the situation where circulation is compromised with the elbow flexed but present with the elbow extended, a period of longitudinal skin traction is a very reasonable option. This maintains the fracture is an aligned position with good circulation. Indeed, this is a valid method of definitive management of Gartland type III fractures. The most common method of traction is that described by Dunlop with skin traction applied to the forearm and a counterweight over the upper arm. This has shown very good results for the definitive management of Gartland type III fractures with up to 93 % good-excellent results that compare very favourably with closed reduction and percutaneous pinning [14, 15].

Interestingly, although this method of treatment has continued to be used in the western world, in spite of an extensive literature search, the author was unable to find any references to the results of its use in the austere environment. This suggests that the resource of 2–3 weeks in a hospital bed can be as limiting a factor as surgical resources. However, it does offer a safe predictable method of managing these injuries where surgical resources are extremely limited.

In addition to vascular complications, some patients have neurological deficits at presentation, most commonly the ulnar and median nerves. These can be managed expectantly as they carry an excellent prognosis. Due to the young age of patients and the extra-articular nature of these fractures, the prognosis for recovery of a good range of motion is excellent. Mal-union is fairly common but, whilst cosmetically unsightly, does not compromise upper limb function. If these injuries present beyond 1–2 weeks post-injury, mal-union is likely and should be accepted. It is hard to see any justification for operating on a mal-union of the distal humerus in a child in an austere environment.

In summary, the key to management of supracondylar fractures in children is to avoid vascular compromise and be prepared to tolerate a degree of mal-union being confident that when the bone unites, stiffness will rarely be a problem. The definitive surgical management needs to be tailored to the resources available.

36.5 Intra-articular Elbow Fractures in Children

The complete ossification of the bones around the elbow until 10–11 years of age makes the diagnosis of intra-articular fractures in children difficult. Knowledge of the order of ossification is helpful (mnemonic = CRITOE – capitellum, radial head, internal (medial) epicondyle, trochlea, olecranon, external epicondyle lateral). Prompt diagnosis requires a high index of suspicion. Oblique images will help diagnose lateral condyle fractures. X-rays of the uninjured elbow can be helpful.

Most intra-articular fractures occur in older children. The most difficult fractures are the lateral condylar (Milch) fractures that occur in younger children. Oblique x-rays help identify the common rotational displacement that is a relative indication for operative treatment. The other indication is associated elbow subluxation. Open reduction is best performed through an anterolateral approach with internal fixation with one or two k-wires.

36.6 Distal Humeral Fractures in Adults

Compared with supracondylar fractures in children, these are relatively rare injuries. They are mostly intra-articular in nature, the transverse supracondylar component being associated with a T or Y extension into the elbow joint. Undisplaced or minimally displaced fractures can be treated in a cast and sling for 3 weeks and then early mobilisation with the expectation of a very reasonable result.

The gold standard of treatment for displaced fractures is open reduction and internal fixation to allow early mobilisation [16]. This requires complex equipment and a high level of surgical expertise. The basic principles consist of an olecranon osteotomy to obtain good exposure to the articular surfaces, provisional reduction of the articular component of the injury with temporary K-wires, reduction of the articular component to the shaft and then definitive fixation using two plates. These can be placed medial and lateral or medial and posterolateral. The aim is to achieve rigid enough fixation to allow early mobilisation and reduce the risks of long-term stiffness.

In the absence of the availability of this type of resource and expertise, closed reduction and percutaneous K-wire fixation will achieve a reasonable position for bony union. It is likely that this will require protection in a cast for a few weeks, leading to some inevitable elbow stiffness. In the absence of any methods of fixation, cast immobilisation of a short period of time and then early mobilisation is the chosen method of treatment though carries a high risk of mal- or non-union and long-term stiffness.

36.7 Radial Head Fractures

These are common injuries, occurring more commonly in women with a peak incidence between 30 and 40 years of age. Classification [17, 18]:

- Mason type I – undisplaced segmental fracture
- Mason type II – displaced segmental fracture
- Mason type III – displaced comminuted fracture
- Mason type IV – displaced comminuted fracture associated with elbow dislocation

Whilst in the western world type II and III fractures tend to be treated operatively, the results of conservative management are very reasonable. The author would recommend a sling for comfort and then early mobilisation. A small number of patients may be left with some long-term discomfort and difficulty with pronation and supination. These could be treated beyond 3–6 months post-injury with a radial head excision (Fig. 36.6). A Mason type IV fracture represents an unstable type of elbow dislocation. If it is not possible to hold the reduction closed, percutaneous pinning should be considered.

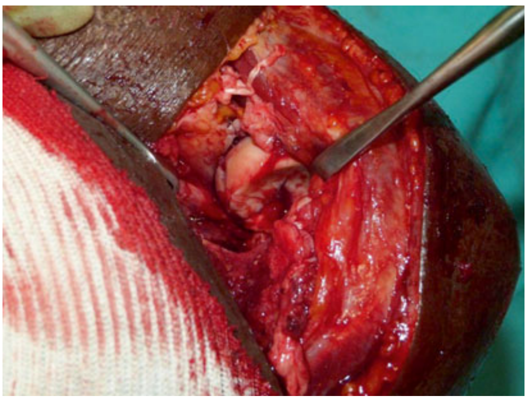

Fig. 36.6 Radial head fracture seen intraoperatively

36.8 Proximal Ulna/Olecranon Fractures

Fractures of the proximal ulna may be intra-articular (olecranon fractures), associated with radial head dislocation (Monteggia fractures) or both. The mechanism of injury is usually either a direct blow such as landing on the point of the elbow or an avulsion fracture when landing with the elbow slightly flexed. Displacement is common due to the pull of the triceps muscle.

Conservative management is recommended for undisplaced fractures and in elderly patients. Undisplaced fractures should be immobilised for 2–3 weeks and monitored for displacement. In the elderly, displacement can be accepted as long as the elbow is not subluxed. Early motion is recommended, the loss of extension strength being tolerated well.

If surgical skills and equipment is available, operative management is recommended for displaced fractures. This author recommends parallel 1.2 mm k-wires supplemented by a figure of eight tension band wire on the extensor surface for avulsion fractures without comminution (Fig. 36.7). This should be successful without intraoperative x-rays if care is taken to avoid pen-

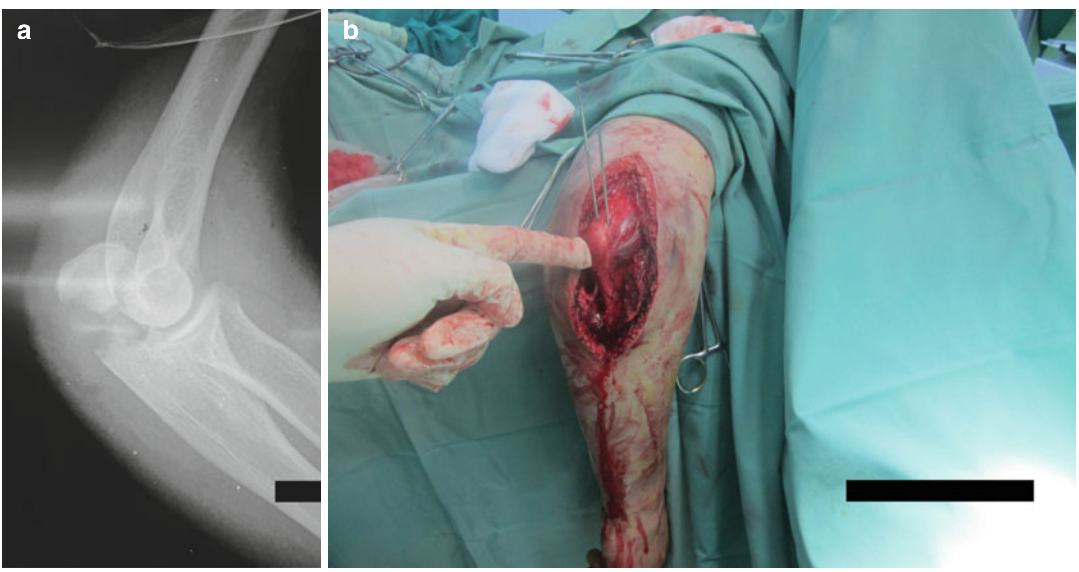

Fig. 36.7 (**a**) Olecranon fracture. (**b**) Placing of wires for tension band wire

etrating the elbow point with the wires. It is worth taking care to bury the ends of the wires to reduce the need for subsequent wire removal.

Fractures in the distal third of the olecranon, with associated comminution or Monteggia fractures, require open reduction and internal fixation with a plate and screws.

36.9 Summary

Prompt, safe competent management of elbow trauma is important to preserve overall function of the upper limb. Early diagnosis and management gives far superior results to delayed management. In an austere environment, equal effort should be given to encouraging early presentation as to developing operative resources and expertise. In any setting, a clinician with sound anatomical knowledge and a good understanding of the treatment options available by setting reasonable outcome goals can achieve good results. The keys to management consist of avoidance of neurovascular and infective complications, prompt joint reduction and aiming for maintenance of reduction in a way that allows early motion.

36.10 Elbow Trauma Case Report

36.10.1 Situation and Resources Available

The location was a small hospital in Makeni, Sierra Leone. Full surgical team include orthopaedic surgeon, anaesthetist, scrub nurse and therapist. Hospital possessed a well-equipped operating theatre and a limited plain x-ray facility. After the 2-week visit, any post-operative supervision is to be provided by a local nurse and physiotherapist.

36.10.2 Clinical Case

On the first day of our visit, we were presented with a 37-year-old female who worked as a secretary, complaining of pain in her dominant right elbow. There was a history of a fall from a moped 3 weeks previously with ongoing pain and loss of function. Treatment from local healers had consisted of application of medicinal herbs. On examination there was a clinical deformity consistent with a posterior dislocation. There was no wound. Movements were from 10° to 30° with associated pain. There was no distal neurovascular deficit. X-rays showed a posterior dislocation without any associated fractures (see Fig. 36.3).

36.10.3 Treatment Rationale

Without intervention this lady would be condemned to a very poor result. Overall, the post-injury pain would be expected to reduce over the next few months. She would be left with significant loss of motion. The elbow would be fixed in a fairly extended posture, seriously compromising her ability to position her still very functional hand in space.

Although there were some concerns regarding supervision and compliance with a post-operative rehabilitation during the first 2–3 months post-surgery, these were felt to be acceptable. Although the local team had no experience of managing patients following open elbow surgery, they were capable of managing a surgical wound, fabricating a splint and constructing and supervising an exercise programme. The patient was educated and demonstrated a strong commitment to obtaining a good result. She lived within reach of the hospital.

The decision was made to plan surgical intervention under general anaesthetic. This would consist of an initial attempt at a closed reduction though with a low threshold for an open reduction. As there was only 3 weeks since injury, this would be through a lateral approach.

36.10.4 Procedure

Under general anaesthetic, it was not possible to obtain a closed reduction. Through a lateral approach, it was possible to achieve a fairly easy reduction after limited soft tissue mobilisation.

The lateral ligaments were found to be torn; they were in good condition and therefore repaired. The elbow was stable through a range of motion from 30° to 120°. The wound was closed, a plaster of Paris backslab applied with the elbow at 90° of flexion. The plan was for 3 weeks of immobilisation and then supervised mobilisation from a collar-and-cuff-type sling which would be worn until 6 weeks post-injury. The patient was reviewed at 10 days post-surgery. The wound was healing well and sutures were removed. There was a range of movement from 50° to 110°. A further plaster of Paris backslab was applied.

She was followed up locally until 3 months post-injury, at which stage she was found to be making reasonable progress. She had a comfortable elbow with a range of motion from 20° to 130° and full pronation-supination.

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