1 Principles

1.1 Indications
Nonoperative treatment by splinting is only indicated for undisplaced, extraarticular fractures, such as 13-A type fractures. It is not suitable for 13-A1.3 type fractures though, which are characterized by incarceration of the fragment in the humero-ulnar joint, unless general contraindications to surgery are present.

1.2 Anatomical consideration
The distal third of the humerus is flattened in the coronal plane and curves anteriorly.

Sometimes, the olecranon fossa and the opposing coronoid fossa communicate through an opening, the supratrochlear foramen. Stability of the distal third of the humerus depends on the lateral and medial supracondylar columns linked distally, as a triangle by the condylar mass. Any rotation causing loss of bony contact decreases fracture stability.
1.3 Distal articular surface
The medial part of the trochlea is bigger than the lateral part and the capitellum, resulting a valgus humero-antebrachial geometry ("carrying angle") of long axis of the humerus passes through the centre of the trochlera about 6° in the coronal plane.

During elbow flexion the forearm moves on a plane such that the hand goes directly towards the mouth. Any changes in the valgus position after the reduction will strongly distort the original plane of movement. Adjustment to the distortion has been blamed for causing secondary shoulder problems.

1.4 Tendency to malalignment
There is a tendency to malalignment and to secondary anterior displacement after reduction.
Similarly, there is the risk of rotation and rotational malposition of the fragments. Reduction is made more difficult by the weight of the forearm acting on the fracture site.

1.5 Deformity
Healing with any deformity (angulation, malrotation, and/or shortening) will usually cause significant elbow dysfunction. The restoration of normal elbow anatomy (anatomical reduction) is of high importance.

1.6 Nerves around the distal third of the humerus
Nerves on both sides of the distal humerus run very closely to the bone, especially the ulnar nerve, which perforates the medial intermuscular septum runs and then in its sulcus behind the medial epicondyle. It can be directly compressed in distal humeral fractures. The radial nerve perforates the lateral intermuscular septum as it loaers the spiral groove on the humerus, torun anteriorly and distally. At the level of the radial head it divides into its deep and superficial branches.

Note: The median nerve crosses the anterior capsule of the elbow joint, running into the forearm between the two heads of the pronator teres muscle.

2 Reduction of A1.1 and A1.2 type fractures (apophyseal avulsion without incarceration)

2.1 Reduction of fracture fragment
The reduction is performed under general anesthesia, or using an axillary block. The arm is pulled with one hand and the fracture fragment is palpated with the other hand. Reduction of the fracture fragment is obtained pushing it into its appropriate position.
2.2 Flexion of the elbow
Flex the elbow up to 90° whilst maintaining the reduction, and apply the posterior splint.

3 Reduction of A2 and A3 type fractures (simple or multifragmentary metaphyseal)

3.1 Distract the fracture
The reduction is performed under general anesthesia, or using an axillary block. The arm is pulled with one hand while the other hand palpates the bony eminences of the distal humerus, i.e., medial and lateral epicondyles. Distraction of the fracture is obtained by pulling the forearm.

3.2 Flex elbow
Flex the elbow up to 90°, whilst maintaining the distraction the whole time - as the elbow flexes the reducing hand also applies distraction.
3.3 Correct rotation
Correct any rotational displacement by applying force to the forearm, whilst still distracting. Once reduction is complete, the distraction is gently discontinued.

4 Fracture splint management

4.1 Apply cast padding
With the patient sitting, if possible, cast padding should be wrapped around the upper arm, elbow, forearm and hand, down as far as the transverse crease of the hand (leave the MP joints free). Keeps the elbow in 90° flexion and the forearm in neutral rotation. Make sure that the epicondyles of the humerus and the antecubital area are well padded.

4.2 Apply splint
A splint of fiberglass, or plaster, is applied on the posterior aspect of the arm and forearm. It should be wide enough to cover more than half of the circumference of the arm and forearm. It is secured with an elastic bandage that should not be too tight.
4.3 Sling
The injured arm is supported in a sling.

4.4 Analgesia
Analgesia will be required. The patient is usually more comfortable in a sitting or semireclining position, with the elbow elevated on pillows at least for the first few weeks. Fragment motion and crepitus may well be perceived, and the patient should be reassured that this is normal, stimulates healing, and will gradually settle.

5. Aftertreatment
The arm is immobilized in a splint for comfort with the elbow at 90 degrees of flexion. Active exercises of the elbow should be initiated within a few days. The elbow is prone to stiffness, and fixation that is adequate to allow functional use of the arm for light tasks is important.

Avoidance of shoulder abduction will limit varus elbow stress. Shoulder mobility should be maintained by gravity-assisted pendulum exercises in the sling.
Active assisted elbow motion exercises are performed by having the patient bend the elbow as much as possible using his/her muscles, while simultaneously using the opposite arm to push the arm gently into further flexion. This effort should be sustained for several minutes, the longer the better.

Next, a similar exercise is done for extension, see illustration.

5.1 Load bearing

No load-bearing or strengthening exercises are allowed until early fracture healing is established, a minimum of 6-8 weeks after the fracture. Weight bearing on the arm should be avoided until bony union is assured.