

FIRST AID IN FRACTURES

Abstract of two lectures

by J. W. LITCHFIELD, M.B., B.Ch., M.R.C.S.,
given at the Royal College of Nursing, London

One of the commonest injuries which require first-aid treatment is injury to bones, particularly fractures. The actual causes of fractures are: (1) Direct violence, the bone being broken at the site receiving the injuring force, as when a leg is "run over." (2) Indirect violence, by means of which a fracture occurs at some distance from the spot receiving the injury, *e.g.*, the clavicle may be fractured by a fall upon the outstretched hand. In this case, the muscles being stiffened the force is transmitted up the arm and jerks up the shoulder so violently that the clavicle breaks. (3) Muscular contraction, a bone being broken by a sudden and violent contraction of muscles which are attached to it. The commonest example is fracture of the patella by a kick which misses its objective, as sometimes occurs in football, or by inadvertently stepping off a kerb and suddenly contracting the muscles of the thigh in order to prevent falling.

Fractures may be classified as follows: *According to the bony injury*: (1) complete; (2) incomplete; (a) greenstick, (b) fissured; (3) comminuted. *According to the extent of the injury to other tissues*: (1) simple; (2) compound; (3) complicated.

Simple fracture. The bone is broken in one place only and no further injury, except moderate bruising, occurs. Such fractures may be described as oblique, transverse or spiral, according to the direction of the break.

Compound fracture. There is a wound through skin or mucous membrane, forming a direct or indirect communication between the broken bone and the external air.

Comminuted fracture. The bone is splintered into several fragments in the same region.

Impacted fracture. The broken ends of the bone are wedged into each other.

Complicated fracture. In addition to the fracture, there is injury to important structures in the surrounding tissues, *e.g.*, an artery, nerve or vein is torn, a joint cavity is opened, or the broken bone injures an internal organ, such as the lung by a fractured rib, or the bladder by one of the pelvic rami.

Incomplete fracture. (a) Greenstick, where a long bone is so bent that the convex surface breaks while the concave portion remains intact. This type occurs only in children whose bones are not completely ossified. (b) Fissured, in which the bone is merely cracked. This may occur in a long bone or in the skull.

Fractures are said to be "pathological" when they occur almost spontaneously as a result of very slight injury. In these cases the



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bones are unusually brittle or they are the site of active disease.

The signs and symptoms of a fracture are as follows:

1. History of an injury.
2. Pain (especially if remote from the site of violence) and tenderness.
3. Loss of function.
4. Deformity from muscular action or as the result of violence or gravity.
5. Unnatural mobility of the part.
6. Crepitus, or a sensation of grating, felt when the broken ends of the bone move over each other. (A first-aid worker should never attempt to elicit this symptom.)

In all probability only a few of these signs will be present, but if a fracture is suspected time should not be lost in trying to confirm the fact. The golden rule is to treat the patient as though a fracture had occurred until it is proved that the bones are intact. Do not remove clothing (unless this is necessary in order to treat haemorrhage or a serious wound), for the incidence of shock is reduced by keeping the patient as warm as possible, and further injury that might accrue from the displacement of fragments is avoided. If the accident occurs in a private house and the fracture is in the lower extremity do not move the patient until the surgeon has seen him, unless he cannot be made comfortable where he is with pillows and rugs.

General lines of treatment include: (1) The control of haemorrhage, if present. (2) The treatment of primary shock, sending to the nearest dwelling for hot drinks, blankets and a hot water bottle. (3) Immobilisation of the fractured bone, in the natural position if possible, utilising the assistance of any available person in the vicinity.

Place one hand above and the other below the seat of injury, grasp firmly and, while maintaining gentle extension, place the limb in the position in which it can be immobilised by fixing some form of temporary splints in place. For this purpose pieces of board, umbrellas, walking sticks, broom-handles, cardboard, or even folded newspapers around a branch of a tree, could be used, and these could be secured by handkerchiefs, scarves, neckties, straps, braces or towels. The opposite limb or the body itself may act as a splint. It may be possible to obtain equipment from the nearest first-aid station or hospital.

A splint must, in all cases, include and extend beyond the two joints of the fractured bone, and in all cases of fracture of the upper extremity the limb must be supported by a sling. When the limb has been immobilised it must be ascertained that the circulation is not impeded in any way.

Fracture of the lower jaw. This is usually due to direct violence, such as a blow on the point of the jaw. It is always compound into the mouth, for the bone lies close under the mucous membrane. Pain is considerable, the inferior dental nerve often being caught in the fracture. The patient cannot close the mouth

or speak, and he supports the jaw with his hand. Irregularity in the line of the teeth can be seen. There is a good deal of bleeding and the patient may vomit.

Splint the lower jaw against the upper by using two triangular bandages or large handkerchiefs folded narrow. Support the chin with one hand placed under it, then apply the first bandage to hold it in position, carry the ends upwards, and tie them on the top of the head. The second bandage is placed over the front of the chin and is tied at the nape of the neck. Then the two ends of this bandage are tied to the two ends of the first one.

Fracture of the clavicle. Usually caused by indirect violence, the fracture occurring near the middle or inner third of the shaft. It is seldom compound although it lies so near to the skin, and it is rarely complicated, in spite of the proximity of the axillary artery. The fractured bone can easily be felt under the skin in the depression of the shoulder, the arm falling downwards by its own weight and being pulled forward and inward by the contraction of the pectoral muscles. The strain is painful, so the patient supports the elbow with the opposite hand and inclines the head toward the injured side.

Remove the coat and, if a man, the brace from the affected side. Take two triangular bandages, folded narrow and preferably padded in the central region, and tie one round each shoulder in a reef knot at the back. Then tie the upper and lower ends respectively to those of the opposite bandage, slipping a pad under the knots and between the shoulder blades. This counteracts the forward and inward displacement. A third triangular bandage is used as a large sling which supports the forearm and elbow. Make sure that the pulse at the wrist is not obstructed.

Fracture of the humerus. The displacement is in the direction of the violence. There is usually inward angulation and there may be injury to the musculospiral nerve. If the fracture is near the shoulder a splint cannot be effectively applied, so the arm is immobilised by binding it to the body itself, using scarves or broad bandages and supporting the wrist with a small sling. This enables the elbow to hang down, affording a certain degree of traction.

For *fracture of the middle of the shaft* flex the elbow and apply three splints on the outer, anterior and posterior aspects of the arm, which must extend from the shoulder to just below the elbow joint. Two narrow triangular bandages secure the splints above and below the site of fracture, and a narrow arm sling is used to support the wrist. *Fracture near the elbow joint.* Tie two splints to form a right angle. Flex the elbow with the palm towards the body. Place a soft pad in the armpit and apply the L-shaped splint to the inner aspect of the forearm and secure them in position with three narrow folded triangular bandages—one around the humerus, one below the elbow, and the third around the wrist and hand. Then put on a narrow sling.

Fracture of the forearm. If both bones are broken the injury is often about the middle of the forearm and there is obvious deformity in this region, but fracture of one bone produces little deformity.

Anterior and posterior splints are applied and a large arm sling is used to give support to the hand, forearm and elbow.

Colles's Fracture. This is caused by indirect violence, *e.g.*, a person falling thrusts out his arm and the force of the fall is received upon his outstretched hand, the weight of the body coming upon the broad lower extremity of the radius. The result is a fracture of the lower extremity of the radius (which may be impacted) and of the ulnar styloid, or a tear of the internal lateral ligament.

The lower fragment of the radius, including the styloid process, is displaced backward and the hand is turned toward the thumb side. The pull upon the flexor tendons makes it impossible to straighten the fingers. The styloid process of the radius, instead of being lower than that of the ulna, is on the same level or higher. First-aid treatment is the same as for other fractures of the forearm.

Fracture of the femur. Fracture of the neck of the femur often occurs in old people as a result of an ordinary fall, from which the patient finds it impossible to rise. Fracture of the great trochanter is usually due to a violent crushing injury. Fracture of the shaft may occur in the upper, middle or lower third. In all of these there is shortening and the lower fragment is pulled up by the thigh muscles. The foot is rotated outwards and cannot be lifted.

Treatment is much the same in all types. If obtainable, a Thomas's splint should be used. Failing this, a long splint to reach from the axilla to a few inches below the foot. Seven triangular bandages are needed, and a soft pad for the axilla. Place the patient on his back in as comfortable a position as possible. Kneel at his feet, and place the right hand behind the heel and the left over the front of the foot on the injured side. Then, applying gentle but firm traction, guide the foot and limb into their correct position. If a Thomas's splint is available, get a helper to slip the upper ring over the foot and draw it up to the top of the thigh until the ischial tuberosity rests upon it. The lower ring of the splint must then extend several inches below the foot. A figure of eight is placed round the ankle and foot and tied under the sole with a reef knot (a narrowfold triangular bandage can be used for this purpose); the ends are then tied tightly to the notch at the lower end of the Thomas's splint. The limb is supported on slings of flannel bandage. These may be applied in strips in the ordinary hospital fashion or, for first-aid work, one long strip may be applied as follows, before the splint is put on: knot the end to the upper ring on the outer side; carry the bandage backwards and forwards round the two bars, passing it always first over the bar and back under it and working down the splint; three or four turns across and back are

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sufficient and the bandage is finally tied again to the outer bar at the lower end at about ankle level. A bandage passing over the legs but under the bars of the splint is fixed just below the knee to steady the limb.

If a wooden splint is used, the injured leg is first gently extended and the extension maintained by tying it to the opposite foot with a figure of eight round the ankle and a second one below the soles of the feet. Bandages are then passed round the thorax and hips, under the thigh (above and below the fracture), the knees, legs and ankle. The splint is secured by tying the bandages round the trunk and ankles, and afterwards the other bandages are adjusted.

To get bandages under the body and legs with the minimum of movement of the patient, fold the prepared bandage horizontally over the end of a flat piece of wood or metal, and push it under one of the natural hollows of the body—the neck, the waist or the ankle—and then slide the bandage to the correct level.

Fracture of the patella. This is usually caused by muscular contraction, but occasionally by direct violence. There is a great displacement of the fragments by the contraction of the quadriceps muscles and, if the injury is very recent, a marked interval can be felt between the two fragments. The joint swells rapidly and there may be haemorrhages into it—haemarthrosis. There is severe pain and complete loss of function, owing to loss of the insertion of the quadriceps.

Counteract contraction of the quadriceps by raising and supporting the head and shoulders, and raising, extending and supporting the foot. Place a broad back splint, which extends from the buttock to just beyond the heel, in position and secure it by a broadfold bandage around the thigh and another around the ankle region. Then apply a figure of eight bandage to assist in bringing the broken ends of the patella together. Place its centre just above the upper fragment, cross it at the back of the knee, over the splint, bring the ends forward at the sides of the joint, and fasten them in front and below the lower fragment of the patella. Cold water compresses may be applied to the joint to reduce the swelling, and, during transport, care must be taken to maintain the angle between the trunk and the thigh by keeping the shoulders and foot well raised.

Fractures of the tibia and fibula. These are usually of the lower or middle third, where the maximum strain comes, and are caused by direct violence. Fracture of the fibula alone gives rise to localised pain, which can often be elicited by “springing” the lower end of the bone. There is no deformity and the patient can usually walk. Fracture of the tibia alone seldom occurs. The bone is so near the surface that a fracture involving the tibia is very often compound. Usually both bones are fractured.

Great care must be taken in handling the limb, remembering the great danger of converting a simple fracture into a compound one. The foot on the injured side is grasped,

extended, and guided into a natural position, in the same way as in fracture of the femur. Use two splints, one at each side, reaching from a little above the knee to just below the foot. Five bandages are desirable: a narrow one above and another below the site of fracture, and a third just above the knee; a broad bandage around both knees; and a figure of eight around both ankles and feet. If only one splint is available it must be placed on the outside of the leg and the sound leg used to complete the immobility; if no splint is obtainable all the bandages must secure the injured leg to the sound one.

Pott's fracture. This is a fracture-dislocation involving the fibula above the external malleolus, with dislocation of the ankle joint and a tear of the internal lateral ligament or fracture of the internal malleolus. The foot is displaced outwards and averted, and the strong contraction of the calf muscles pulls it backwards. In all injuries involving the ankle joint the first-aid treatment is the same as for fracture of the tibia and fibula.

General. It may be necessary to remove the clothing in order to control haemorrhage or to dress a wound. In the case of the upper limb the sound arm must be removed first. In the lower limb the outer seam of the trousers could be slit up, the bootlaces cut, and, if necessary, the back seam of the boot ripped up. If there is no haemorrhage and sterilised dressings are not available, as little as possible should be done to the wound, beyond covering it with a clean handkerchief. On arrival at a hospital the wound should be covered whilst the skin around it is cleansed, then the injured edges are removed, the haemorrhage controlled by torsion and the skin sutured as far as is possible. The limb would probably be immobilised by a plaster of Paris splint, leaving a window for the dressing of the wound. All cases of compound fracture should be given an injection of tetanus anti-toxin and also anti-gas-gangrene serum.

Most persons with fractures of the upper extremity are able to walk when once the fracture has been immobilised. For fractures of the lower extremity the patient should be carried on a stretcher. If none is available, a shutter or door can often be improvised.

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