

fracture may be caused by indirect violence in another way, the most common example of which is seen in a man who slips upon a piece of orange peel, and, instead of falling gracefully forward or backward, makes a violent attempt to save himself, bringing all the muscles of the thigh into strong action, with the result that a sudden snap is heard and he falls down. On being raised, it is found that he cannot stand on one or other leg, its *patella* or knee-bone having been cracked right across the centre by the powerful muscles attached to it, which have snapped it in fact across the hard ends of the thigh and leg bones exactly as one snaps a piece of wood across one's knee. Or, again, a man falls from a ladder, alighting on his feet, yet drops down in a heap, unconscious, and finally dies; and it is found that the base of his skull has been fractured by *contre-coup*, the force of the fall being conveyed by the lower limbs and spinal column, and spending itself where the junction of the latter and the skull bones take place, by cracking the bones right across and tearing one of the large blood vessels. The blood pouring out on the surface of the brain causes such pressure on it that coma or deep unconsciousness is caused.

The signs of an ordinary fracture are usually so simple that they cannot be misunderstood for anything else. There is first a distinct crack heard and felt by the patient, followed by severe pain at the seat of injury, inability to move the limb, and marked distortion of its shape. On touching it, and attempting to straighten the limb, a crackling, grating sound is heard, which is termed *crepitus*, and which is due to the rubbing of the broken ends together.

If the fracture is *compound*, the skin over the injured part is, as we said before, torn to a greater or less extent, and in this form the injury is very much more serious to the patient than when the skin is unbroken, because compound fractures are much more often dangerous than simple; the difference being explained by the fact that in the former cases the broken bones and torn muscles are more or less exposed to the air. Thirty years ago, this accident, therefore, was looked upon much more gravely than it is in these days of aseptic surgery; because, too often, then, the exposed tissues were infected by dirt or disease, and very often after a long illness the limb had to be amputated. Still, even to-day, the first thing to be done in a case of compound fracture is to close the external wound and so prevent, as far as possible, any infection of the torn tissues. The simplest way of understanding what takes place when a long bone is broken is to take a piece of firewood, nail at the top a piece of

elastic; stretch this as tightly as possible, and nail it at the bottom of the stick. This will represent one of the many muscles attached to a bone. Then break the stick and notice how the broken ends are at once driven apart by the contraction of the elastic, and how comparatively difficult it is to fit the broken ends again together. Then one can realise how the ends of a broken bone are separated and dragged apart by the contraction of its various muscles.

It is also easy to understand that the broken ends of the bones joggling amongst the muscles, nerves, and bloodvessels will tear with their sharp points these delicate tissues. So it becomes a matter of the first importance that fractures should be attended to *immediately*; because, for example, a simple ordinary fracture can cause a fatal result by tearing across a large bloodvessel in its vicinity—a good example, by the way, of a fracture which is termed *complicated*. In the treatment of fractures, therefore, the golden rule is to *fix the broken limb as soon as possible*; and it is in these accidents that there have been obtained some excellent results from the instruction given in the First Aid Class of St. John's Ambulance Association, and other similar teaching bodies. For instance, an experienced bystander can confer inestimable benefit upon the sufferer, with a fractured limb, by tying his stick or umbrella, with pocket handkerchiefs, along the course of the injured bone, thereby fixing it firmly above and below the fracture—in other words, carrying out for the immediate moment the precise treatment which the surgeon will afterwards more carefully adopt; and, as a measure of precaution, preventing the movements of the fractured ends, which, as we have seen, may be so productive of danger, or, at least, of injury to the patient. As a general rule, the nurse does not see the patient until coincidentally with the surgeon's treatment, and then finds that the upper part of the broken limb requires to be firmly held while the surgeon draws the lower part steadily down with the fingers of one hand placed over the seat of fracture, until he has brought the broken ends into exact apposition with each other. When that is accomplished, splints are placed upon each side of the limb and secured above and below the fracture with strapping, so as to render the fragments immobile, and then these are finally secured with a bandage.

Now let us imagine that a patient with a fractured leg has been thus treated, and that we have the power to look through the skin and muscles down to the bone, and watch the manner in which Nature will repair the injury. The first thing we observe is that the blood

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