CONCEALED DAMAGE FROM A RUN-OVER ACCIDENT

Report of a Case

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This case is recorded in order to illustrate an unusual and severe form of injury. The chief point of interest lies in the fact that this was primarily a concealed lesion in which the gross and irrecoverable damage to the soft tissues of the limb was revealed only after an interval of several days.

CASE REPORT

A boy of five years was admitted to Westminster Children's Hospital having been run over by a car less than one hour before. A wheel of the car had passed over his right leg.

FIG. 1
Radiograph of right femur on admission.

Clinically there was obvious deformity of the thigh, with a wound one inch long on the adductor surface. Radiographs disclosed an oblique fracture of the shaft of the femur approximately at the level of this wound (Fig. 1). There was no evidence of any other injury to the limb. One hour after his admission the wound edges were excised and the haematoma was evacuated. The skin was sutured and the fracture reduced by skin traction on a Thomas splint.

The next day the child appeared comfortable, but he was unable actively to dorsiflex the ankle and any attempt at passive dorsiflexion caused severe pain. The bandages enclosing the leg were promptly removed, but apart from an effusion into the knee joint no striking abnormality was observed. The pain on passive dorsiflexion persisted, and on the second day the bandages were again removed, but no cause for the symptoms was found. On the fourth day the foot became blue and swollen. This time when the bandages were removed there was a "collar" of puckered bluish skin, about three inches wide, around the whole circumference of the mid-calf except over the subcutaneous border of the tibia and over the fibula. The abnormal skin was anaesthetic, and the tissues beneath it were tense.

Treatment—To relieve the venous obstruction in the foot an incision was made in the mid-line of the calf through the area of discoloured skin. The subcutaneous tissues were under tension and contained a mass of grossly distended veins, all thrombosed. When the deep fascia was incised the calf muscles bulged into the wound. They were deep blue in colour and friable, and they oozed an almost black exudate. The colour of the foot improved rapidly. Since closure was impossible the wound was packed lightly with vaseline gauze.

Progress—For twelve hours the colour of the foot remained normal, and pulsation was present in the dorsalis pedis and the posterior tibial vessels at the ankle. Thereafter the foot became white and no arterial pulsation could be felt. A few hours later the patchy discolouration of "marbling" was apparent.

FIG. 2

FIG. 3

Photographs of the limb two months after injury, showing the two scarred areas, and the areas of undamaged skin over the tibia and fibula. (The discoloration of the great toe is caused by iodine.)

from the calf and posterior tibial muscles showed them to be infarcted.

Four days after the operation the discoloured area of the calf was clearly gangrenous and was separating from the living tissue at a well marked line of demarcation. Sixteen days later the whole of the calf and the anterior tibial muscle compartment within the damaged zone dropped away from the leg, leaving two granulating wounds covered with thin streptococcal pus. Skeletal traction was discontinued on the thirty-fifth day, and ten days later "postage stamp" skin grafts were applied to the granulating areas. At this time the original "collar" area consisted only of tibia, fibula and interosseous membrane, covered with granulation tissue, examination of which revealed no muscle tissue. The skin was fully healed eight weeks after the injury. At that time knee movements were full and painless; there was a 20-degrees' range of passive movement at the ankle. The whole limb distal to the upper limit of the "collar" was completely anaesthetic (Figs. 2 and 3). Nevertheless walking was resumed and the child made good progress. During the year since the injury he has had two paronychias and one heel sore, all of which healed slowly but satisfactorily. The dorsalis pedis and posterior tibial pulses have remained, and as there is no evidence of pulsation in the anterior and posterior tibial arteries beneath the scars it can only be assumed that the anastomatic channels in the intact

Subsequent treatment and progress—

The arteries of the limb were explored. The femoral and popliteal arteries and the posterior tibial artery in the floor of the calf incision were pulsating normally. At about the junction of the uppermost and middle thirds of the leg the posterior tibial artery was found to be in spasm. Blood was withdrawn from the patent lumen just proximal to the spasm and seven cubic centimetres of normal saline containing 5,000 units of heparin were forced distally into the vessel. Procaine was injected into the posterior tibial nerve to encourage peripheral vasodilation. Skeletal traction through the tibia was substituted for skin traction, and the limb was again slung in a Thomas splint. Within ten minutes of the intra-arterial injection pulsation was again palpable in the posterior tibial artery, and twenty minutes later it was felt in the dorsalis pedis.

Examination of specimens taken

FIG. 4

Infra-red photograph two months after injury showing superficial venous drainage of the foot.

skin over the tibia and fibula have contributed to these pulses. Infra-red photographs showed abundant superficial venous drainage of the foot and ankle (Fig. 4).

DISCUSSION

Whether or not this limb will become a constant liability is as yet uncertain. As it remains completely anaesthetic, constant vigilance for minor sepsis is required; yet as a "prosthesis" it is quite satisfactory in its present condition. Should intractable sepsis supervene, below-knee amputation would be impracticable at present because of the shortness of the stump available. But since the upper tibial epiphysis is still present it is hoped that further growth may be sufficient to permit a satisfactory below-knee amputation should it eventually become necessary.

The precise mechanism of this injury is uncertain. It seems probable that the wheel, in passing over the limb, caused enough local trauma to devitalise the soft tissue beneath the area of impact. At the same time it must have subjected the whole limb to a torsional strain which caused the fracture of the lower third of the femur. The effusion into the knee joint lends support to this supposition. The delayed skin involvement is probably explained by interference with the subjacent blood supply. This could be produced by the rubber tyre of the vehicle at the moment of impact "picking up" the more freely mobile skin and subcutaneous tissues and temporarily wrenching them away from the deep fascia. Nevertheless it is remarkable that the signs of skin involvement did not appear sooner. Borchard (1938) noticed that in run-over injuries there was frequently a ring-shaped detachment of subcutaneous tissues without injury to the skin itself. Slack (1952) considered that this stripping of the skin and subcutaneous tissues from the deeper structures is a constant feature and he described open and closed injuries, depending on whether the skin itself is split or remains intact at the time of this momentary wrench. Henderson and Rouillard (1953) remarked upon the common incidence of delayed deep tissue necrosis in the open type of injury, and in closed injuries Slack (1952) advocated early incision, even into suspicious areas of tension, in an attempt to avoid massive skin gangrene.

A further remarkable point in this case is that there was no fracture at the site of impact, but Slack records that only half of his own cases sustained fractures and that such fractures as occurred were caused by some additional stress such as angulation.

The point of greatest importance is that the type of injury recorded here is a concealed one, and thus it may be difficult to recognise.

SUMMARY

A case of concealed run-over injury of the lower limb, complicated by delayed local gangrene and peripheral vascular involvement, is described and the mechanism of the lesion discussed.

I am most grateful to Mr David Levi for permission to publish this case, and to the Westminster Hospital Photographic Department for the photographs.

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