

TRAUMATIC ANEURYSM

THE ANGIOGRAPHIC DEMONSTRATION FOLLOWING A FRACTURE OF THE FEMUR

M. BERK, M.B., CH.B. (CAPE TOWN), D.M.R.D. (R.C.P. & S. ENG.)

X-ray Diagnostic Department, Johannesburg General Hospital

Cerebral angiography has been widely used in the diagnosis of cerebral trauma, especially chronic subdural haematomata. The use of percutaneous peripheral angiography in trauma of the limbs is a less well-established procedure. Modern advances in vascular surgery make it highly desirable to have as much information as possible before operation, especially the situation and nature of the lesion.

The following case demonstrates the value of angiography and indicates the necessity for a more widespread use of angiography in vascular injuries.

CASE REPORT

On 15 June 1956, the patient, J.C., who was aged 64 and a pensioner, was admitted to hospital after a fall which involved the stump of a below-knee amputation of his right leg.

While entering his flat in the dark, he had fallen on the amputation stump.

In 1947 he had undergone a below-knee amputation of his right leg after an accident and had been subsequently fitted with an artificial limb.

On admission the condition of the patient was fair. Pulse rate 92 per minute. Temperature 99°F. Blood pressure 158/74 mm. Hg. Nothing of note was observed on systematic examination. Massive bruising was present, extending from the right iliac fossa, round towards the right loin, and down over the right thigh. The femoral pulse was easily palpable, and the amputation stump was healthy. X-ray examination revealed a markedly comminuted fracture of the shaft of the right femur (see Figs. 1-3).

The swelling of the leg persisted and on 21 June immobilization of the fragments was attempted with a Steinmann's pin and Thomas's knee flexion splint. Subsequent X-ray examinations showed that the immobilization was ineffective.

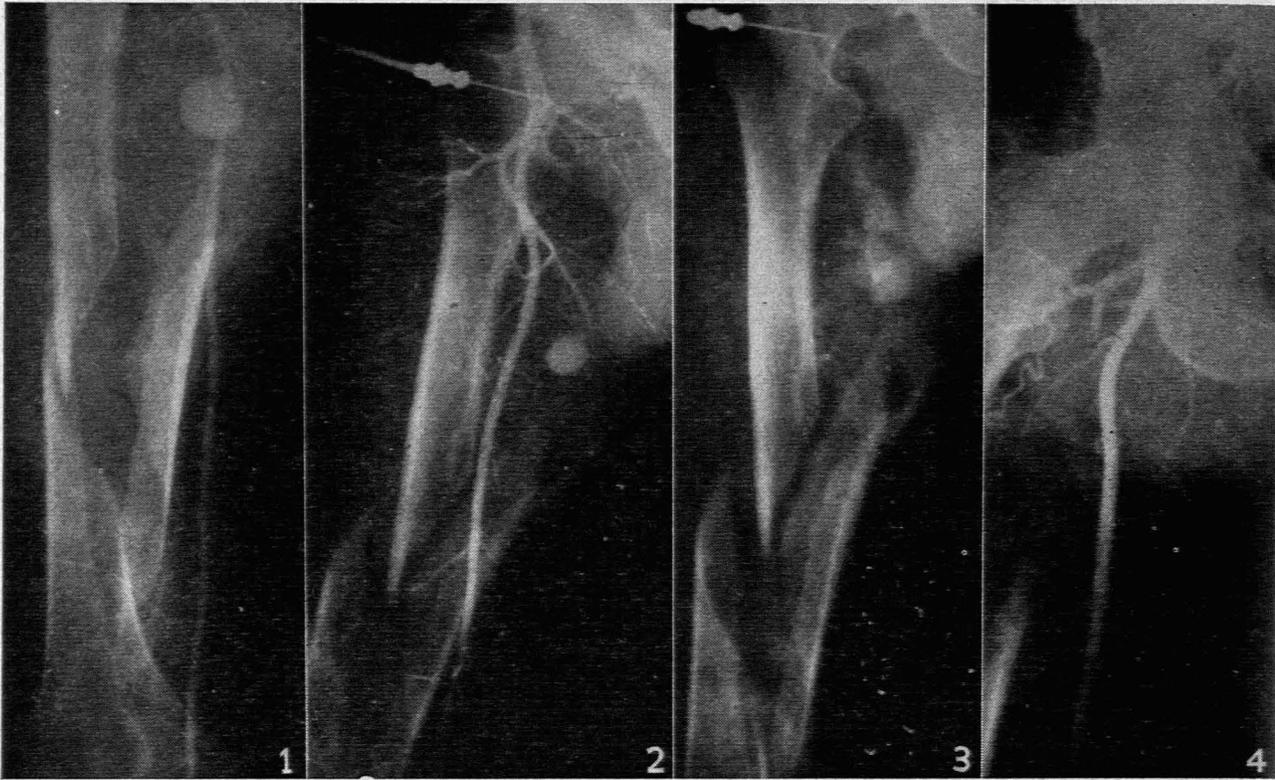


Fig. 1. Demonstrates a traumatic aneurysm apparently involving the femoral artery. The normal calibre of the femoral artery should arouse suspicion.

Fig. 2. The oblique film demonstrates that the traumatic aneurysm involves the profunda femoris artery only.

Fig. 3. Delayed film showing dye diffusing in the tissues.

Fig. 4. Follow-up plate showing the ligation of the profunda femoris artery.

Two weeks more elapsed with gradual increase in the size of the right thigh, and increasing signs of inflammation. Immobilization by means of skeletal traction was continued, but without much success. On account of the increasing swelling, needle aspiration was attempted and 100 c.c. of blood-stained fluid was withdrawn.

The right thigh continued to swell, and a week later, under general anaesthesia, a lateral incision was made into the right thigh and about 2 pints of dark blood was removed. Skeletal traction was re-applied. At this stage sepsis was increasingly evident.

One week later, the patient suddenly collapsed with all the signs of loss of blood, and emergency percutaneous femoral angiography was performed. The subsequent films showed a well-marked traumatic aneurysm of the profunda femoris artery (Figs. 1-3). The profunda artery was ligated proximally under general anaesthesia, as shown in a post-operative angiogram (Fig. 4), the Steinmann's pin was removed, and compression bandages were applied. Sepsis however became increasingly difficult to control, immobilization of the bone fragments was virtually impossible to achieve, and an amputation above the fracture was decided upon, and performed on 31 July.

Subsequently the patient developed septicaemia, and in spite of massive antibiotic therapy succumbed on 30 August 1956.

DISCUSSION

Watson-Jones¹ writes thus on traumatic aneurysms: 'The femoral artery is sometimes perforated in the upper thigh by one fragment of a fractured shaft of femur. The circumference of the thigh is increased several inches by a deeply

fixed swelling, which is extremely hard, may slowly increase in size, does not at first pulsate, and may also present the clinical picture of a sarcoma of bone. After several months, as the haematoma undergoes resolution, the development of expansile pulsation and a systolic bruit makes the diagnosis clear. Regular measurement of the limb should be recorded.'

The above description almost parallels the case in question, and it is in this type of case that angiography can be invaluable in arriving at an early diagnosis. Moreover, in any case of trauma where the extent of the swelling cannot be accounted for by the injury *per se*, resort should be had to angiography to exclude or confirm vascular injury. The presence of a good femoral pulse, as this case demonstrated, does not exclude vascular trauma.

TECHNIQUE

The subject of angiography is fully discussed in an article by D. Sutton.²

The technique of percutaneous peripheral angiography is easy, simple and relatively quick. The apparatus consists of (1) An ordinary serum needle, (2) polythene connection, and (3) a 20-c.c. syringe. This system is filled with saline.

Two other 20-c.c. syringes are necessary, one being filled with dye and one with saline. The purpose of the saline is to keep up continuous perfusion to prevent clotting once the artery has been successfully punctured.

The artery is now palpated digitally, the skin is punctured by the needle, and once the skin is punctured the syringe containing the saline is detached. The purpose of detaching the syringe is to enable the column of saline to be displaced by arterial blood, once successful puncture of the artery has been achieved.

The needle is now advanced until the pulsations of the artery are transmitted to the operator's fingers. Thereupon the artery is transfixated by the needle and upon slow withdrawal of the needle a column of bright red blood displaces the saline. Continuous slow perfusion is commenced until the radiographer is ready, when the injection of the dye is made as fast as possible, and further perfusion by saline is carried out until the films have been inspected and are satisfactory. Further aspects of this technique remain to be stressed.

1. The writer uses 60% urografin and overfills a 20-c.c. syringe. The first exposure is made when the syringe is three-quarters empty.

2. The value of a second film taken as soon as possible after the first film. In the case under discussion, in the second film (Fig. 4) visualization of the dye in the tissues is well demonstrated.

3. The importance of taking an oblique or lateral film wherever possible. In this case the first film suggested that the femoral artery was the site of the traumatic aneurysm, but the oblique film showed that the femoral artery was intact, and that the profunda artery was involved.

SUMMARY

A case of traumatic aneurysm following fracture of a femur has been described. The technique of percutaneous peripheral angiography is described. An attempt has been made to show the value of percutaneous angiography, and it is suggested that wider employment of angiography in trauma might be invaluable in certain cases, especially where vascular injuries are suspected.

I should like to express my indebtedness to Dr. Joss Kaye, Chief Radiologist of the Johannesburg General Hospital for his help and encouragement, and express my thanks to Miss Tompkins for her excellent reproductions.

REFERENCES

1. Watson-Jones, R. (1952): *Fractures and Joint Injuries*, 4th ed., vol. 1., p. 106. Edinburgh and London. Livingstone.
2. Sutton, D. (1955): *Brit. J. Radiol.*, **28**, 325.