

Fractures Caused by Muscle Traction Following Lumbar Myelography with Meglumine Iothalamate (Conray 60) and Meglumine Iocarmate (Dimer-X)

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Summary. One case of extensive bilateral pelvis fractures as a result of muscle seizures following lumbar myelography with Conray 60 is described. The patient died from massive retroperitoneal hemorrhage and showed signs of so called pulmonary fat embolism secondary to the fractures. Also a case of fracture of the femoral neck following lumbar myelography with Dimer-X is reported.

Zusammenfassung. In einem Fall wurden ausgedehnte Beckenfrakturen als Folge von Muskelkontraktionen nach lumbaler Myelographie mit Conray 60® beobachtet. Der Patient verstarb infolge einer massiven retroperitonealen Blutung und zeigte eine pulmonale Fett-embolie. In einem anderen Fall trat eine Schenkelhalsfraktur nach einer lumbalen Myelographie mit Dimer-X® auf.

Key words: Fracture of femoral neck, caused by muscle traction — Traumatology, fractures caused by muscle traction.

Since the beginning of the 30s lumbar myelography has been performed with water-soluble contrast media of the type sodium-monoiodomethane sulphonate, generally called methiodal sodium (Kontrast U Leo®). This contrast medium has such an irritating effect on the meninges and nerves that the examination can be performed only after spinal anaesthesia.

During the 60s meglumine iothalamate (Conray 60) was introduced and the dimer of the Conray molecule, meglumine iocarmate (Dimer-X), as a step in the search for contrast media with less severe neurotoxic effects. These contrast media have a higher content of iodine than Kontrast U and do not mix so readily with the spinal fluid, properties which have improved the diagnostic possibilities. Examination with these latter contrast media does not require spinal anaesthesia. The re-absorption of Conray 60 and Dimer-X is much slower than that of Kontrast U, which, as far as the examination concerned, is an advantage (Ahlgren, 1969; Irstam *et al.*, 1970; Irstam, 1973).

The side effects occurring occasionally after the use of Conray 60 and Dimer-X suggest a low toxicity. The most serious effect of these media for lumbar myelography is their tendency to cause clonic convulsions or muscular twitchings of the legs. In a heterogeneous French material in which the patients had been examined with Conray 60 Serre *et al.* (1968) reported clonic convulsions in 3%

of the cases. In a similar type of material, examined with Dimer-X the corresponding frequency was 1% (Lab. A. Guerbet, 1970).

Gonsette (1971) and Haase *et al.* (1973) described fractures of the femoral neck and vertebral column, respectively, in association with convulsions after myelography with Conray 60.

This paper describes two fractures, one of the pelvis and one of the femoral neck, following lumbar myelography with Conray 60 and Dimer-X, respectively.

Case 1

A 63-year-old man with assumed intervertebral disc herniation was admitted to a county hospital in southern Sweden for diagnostic evaluation. Lumbar myelography was performed according to the technique recommended by Irstam *et al.* (1970) and with Conray 60. The

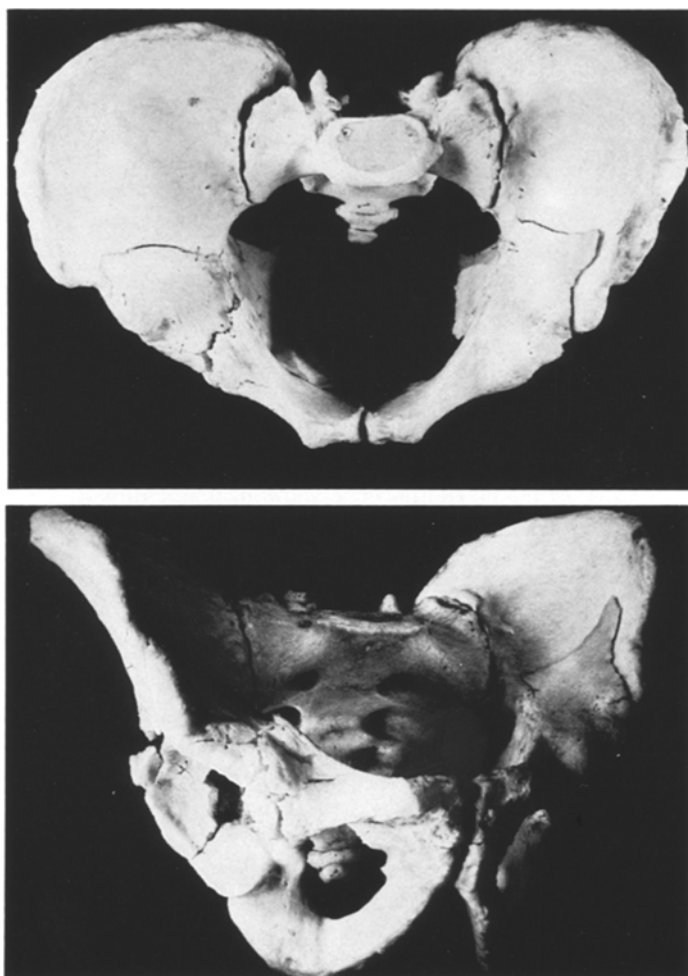


Fig. 1. Macerated preparation of the pelvis showing bilateral fractures of the iliac and pubic bones. The right acetabulum is fractured into several fragments (case 1)

patient was premedicated with 5 mg diazepam (Valium®) i.v. The patient lay on the effected side with the head end of the examination couch raised approximately 20°. After lumbar puncture and aspiration of CSF 8 ml of a mixture of equal parts of spinal fluid and Conray 60 was injected. During the examination most of the contrast material was situated in the caudal part of the subarachnoid space but a 5 mm wide column of the contrast medium extended cranially to the level of Th 12. The examination proceeded without complications.

The patient was transferred to the intensive care unit for continuous observation. 3 hrs after the end of the examination second-long muscle seizures occurred with contractions of the extensor muscles of the trunc and extension of the legs. The seizures were accompanied by short and sharp cries. Repeat intravenous injections of diazepam had no demonstrable effect. The seizures increased in frequency. After 3 hrs the systolic blood pressure fell to 40 mm Hg while the seizures continued. An additional dose of 50 mg of diazepam i.v. by repeat injections substantially reduced the severity of the seizures but, in spite of intensive chock therapy, the patient died with cardiac arrest 11 hrs after the myelography.

Post mortem examination revealed a bruise on the right hip, but no other external signs of injury. Bilateral symmetrical vertical fractures of the pelvis (os ileum and os pubis) extended through the acetabuli (Fig. 1). An additional vertical fracture was found in the right os pubis, which extended laterally to the anterior aspect of the right acetabulum. Extensive retroperitoneal hemorrhages were found surrounding the pelvis fractures. Signs of so called fat embolism were seen in the lungs.

Case 2

A 40-year-old man who had had lumbosciatic pain for many years was referred to Sahlgren's hospital for lumbar myelography. The examination was performed with 5 ml of Dimer-X mixed with 3 ml of spinal fluid and with the technique referred to above. Not until several



Fig. 2. (A) Fracture of femoral neck, untreated. (B) Fracture of femoral neck, reduced and fixed with osteosynthesis material. (C) About 2½ years later: clear necrosis and deformation of femoral head (case 2)

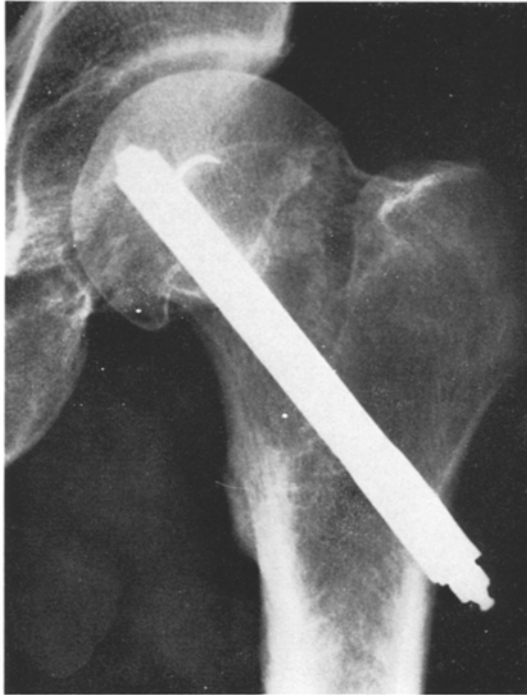


Fig. 2B



Fig. 2C

hours after the examination did the radiologist observe that the contrast mixture had passed upwards during the examination and reached the medullary cone at the level of Th 12.

2 hrs after the examination the patient suddenly lost consciousness for a few seconds. This was attended by a severe fall in the blood pressure, which was promptly controlled by medicinal treatment, and by prolonged severe clonic convulsions confined mainly to the left hip. Despite intense and heavy medication with diazepam i.v. the convulsions persisted for 8 hrs.

After the convulsions had ceased the tendon reflexes of the legs were hyperexcitable for a further 48 hrs.

The convulsions resulted in a medial fracture of the femoral neck. The fracture was reduced and fixed with a winged nail. 2 years later the fracture had healed but the femoral head was necrotic (Fig. 2).

Discussion

The most serious side-effects of meglumine iothalamate and meglumine iocarmate (Conray 60 and Dimer-X, respectively) are muscle convulsions and fibrillar twitchings of the legs; these seizures occur in some patients if the contrast medium comes into contact with the medullary cone. In most cases it has been possible to control neurologic symptoms by diazepam intravenously. But in some patients fractures have been reported as a result of convulsions during examination with Conray 60. In these cases, however, the patients had not been premedicated with diazepam and the dose of contrast medium used had exceeded the recommended maximal dose (5 ml).

It is known that small pelvic fractures, namely avulsion fractures of the anterior superior and inferior iliac spines, may be produced by muscle contractions (Voigt, 1965). Extensive pelvic fractures are regarded as a consequence of external trauma to the pelvis and, as far as we know, have never before been shown to be caused by muscle contractions.

In the above case of the extensive pelvic fractures, the preliminary autopsy report considered it unlikely that the fractures had been caused solely by muscle contractions. A thorough investigation was therefore recommended in order to exclude, for example, a fall from the examination couch or the bed. However, subsequent investigation revealed nothing suggesting that the fractures had been caused by external trauma. The patient had been under continuous observation and had not been subjected to any external violence. This case shows that muscle contractions can cause even major fractures of the pelvic bones.

The probable cause of these severe convulsions was that the contrast medium had for some time during or after the examination reached too high in the spinal canal and thereby come into contact with the medullary cone. Owing to the slow absorption and the high concentration of the contrast medium, the contact might have been long. Our patient material at Sahlgren's hospital includes several cases in which contact had occurred between the conus and the medium without consequent complications. But in all those cases where seizures had occurred contact had demonstrably occurred between the contrast medium and the conus.

The reason why the cases described run such a serious course was probably that diazepam was given too late in too small a dose when seizures appeared. In the light of our present knowledge and experience we feel that if diazepam does not promptly arrest strong convulsions, curarisation and treatment in a respirator

should be started without delay to prevent damage by the seizures. In case 2 this procedure was not considered until late, by which time the convulsions had practically ceased; therefore no such treatment was given in this particular case.

Published cases of fractures after lumbar myelography with the above mentioned contrast media and our personal experience have induced us to focus special attention on the risk of such complications. Thus, in those cases where the contrast medium has demonstrably or possibly extended too high up the spinal canal we give diazepam i.v. prophylactically immediately and in large doses. A second spinal puncture is often made and unabsorbed contrast medium is aspirated. EEG is repeated at intervals during the following 24 hrs after the myelography to detect prodromes (spikes) of convulsions early. Since we started this preventive treatment no convulsions have occurred in about 500 patients.

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