Int J Leg Med (1991) 104:299–301

International Journal of
Legal Medicine

Fatal poisoning with intravenously injected methadone and no fresh injection marks found

Steen Jensen and M. Gregersen

Institute of Forensic Medicine, University of Aarhus, Finsensgade 15, DK-8000 Aarhus C, Denmark

Received June 12, 1991 / Received in revised form August 22, 1991

Summary. Drugs addicts are commonly brought to casualty wards where they often pose a diagnostic problem. They are typically brought in unconscious with no signs of disease or trauma. The suspicion of poisoning arises by the finding of fresh injection marks. This paper describes a case in which a young male drug addict was dead on arrival in hospital without recognizable recent injection marks but with some old wounds or necroses in both groins. The autopsy and toxicological analyses revealed that death was caused by an overdose of methadone and that the necroses in the groins were fistulas facilitating administration of the drugs directly into larger veins.

Key words: Drug addiction – Injection marks – Atypical administration

Zusammenfassung. Drogenabhängige werden im allgemeinen auf Unfallstationen verbracht, wo sie häufig diagnostische Probleme verursachen. Typischerweise sind sie bewußtlos und haben keine Zeichen von Erkrankung oder Trauma. Der Verdacht einer Vergiftung entsteht durch die Auffindung frischer Injektionsmarken. In dieser Veröffentlichung wird ein Fall beschrieben, in welchem ein junger Drogenabhängiger bei der Ankunft im Krankenhaus bereits tot war, ohne erkennbare frische Injektionsmarken, aber mit einigen alten Wunden oder Nekrosen in beiden Leistenbeugen. Die Obduktion und die toxikologischen Analysen deckten auf, daß der Tod durch eine Überdosis von Methadon verursacht war und daß die Nekrosen in den Leistenbeugen Fisteln waren, welche die direkte Applikation der Drogen in größere Venen ermöglichten.

Schlüsselwörter: Drogenabhängigkeit – Injektionsstellen – Atypische Applikation

Offprint requests to: M. Gregersen

Case report

Drug abusers, especially those addicted to intravenously administered drugs, often give rise to diagnostic problems when brought to hospital. In this case a 30-year-old man was brought to hospital and according to the report, it was an emergency case with a person "in coma". When the ambulance arrived, resuscitation was started and continued during the transport to the hospital but at arrival at the hospital he was dead. The body was naked and inspection of the skin showed no fresh injection marks. Two alterations of the skin were noted in the groins but they appeared to be older lesions.

The deceased was known to be drug addicted and had used methadone for several years. He was in good health and had a normal job, although for the last 2 days he had been ill, and according to his wife had influenza. On the day he died, his wife had picked up his methadone for the weekend at the drug store. She arrived home around 12 am and gave him the methadone – 3 bottles of 80 ml each. The wife did not see what he did with the methadone but she knew he often injected it. Later, in the afternoon she pulverized dissolved and filtered 7.5 tablets of Ketogan (a composite drug containing ketobemidone and A29) which she gave him in a syringe. The wife saw him having trouble handling the syringe but she did not know whether he had injected the methadone at this time. She also reported that the deceased had often taken a similar amount of methadone without complications. A friend reported that he had given the deceased three 5 mg tablets of diazepam during the morning while waiting for the methadone. Several empty bottles of methadone including the 3 bottles picked up that day were found under the bed together with 3 needles and a 20 ml syringe.

Clinically, the man had behaved perfectly normal around noon. At around 4 pm he behaved strangely, had urinated and defecated in bed and had called his wife by

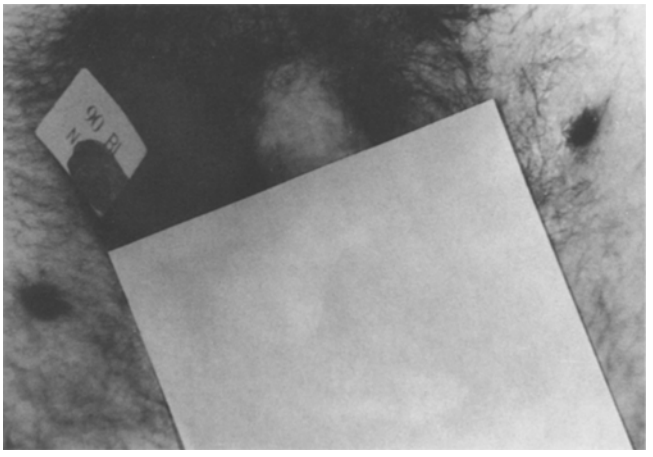

Fig. 1. The wounds in the groins as seen at autopsy

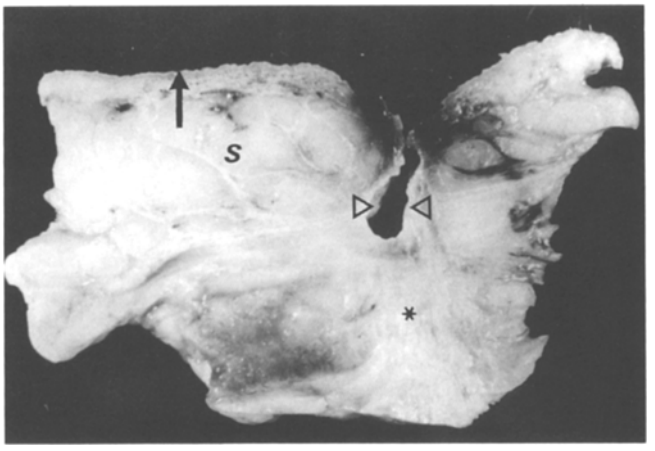

Fig. 2. The fistula in the right groin after isolating the area of interest. *Arrow*, skin surface; *arrow heads*, fistula from skin surface towards underlying vein; *s*, subcutaneous fat; *asterisk*, scar tissue

various names. After being cleaned, he slept until around 7.30 pm. Then again, he behaved strangely and mumbled incomprehensible words and 5–10 min later he was found lying on his back in the bed. He was very pale and did not respond to touch. An ambulance was called immediately.

Autopsy findings

At autopsy the man was described as 182 cm tall, weighing 72 kg and of normal build.

The *lungs* were oedematous with profound stasis, but without macroscopically visible pneumonia. No aspiration of food was found. The stomach contained 270 g fluid but no formed elements.

The *liver* was moderately enlarged (2775 g) with increased consistency of the parenchyma and the cut surface was rough with small white elevations. The *spleen* was significantly enlarged, weighing 904 g, and the cut surface gave the impression of ongoing or recent infection. The *other organs* were normal.

Scars and older wounds were found at the usual injection sites on the *arms* but no fresh injection marks.

In both *groins* circular necrotic areas were seen measuring approximately 1 cm in diameter, and placed approximately 12 cm below the iliac crest. In both necroses it was possible to lead an explorer several centimeters into the groins. Incisions in the region showed recent bleeding on the right side. The lesions on both sides formed fistulas from the skin down to the underlying veins.

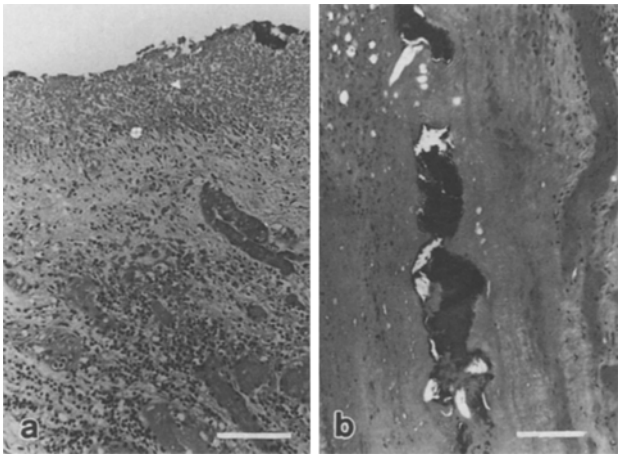

Fig. 3a, b. Microphotographs showing fistula and surrounding tissue. **a** H & E-staining showing fresh bleeding, necrosis and infiltration with lymphocytes. **b** Adjacent area seen with polarization microscope showing abundant tablet residues. Bar = 100 µm

Histological examination

The *lungs* had varying degrees of oedema and a profound stasis, and several granulomas around tablet residues were seen. In 5 sections, one from each lobe of the lungs, one small focus of pneumonia was found. The *liver* showed pronounced steatosis and some fibrosis but neither necrotic areas nor granulocyte infiltrations were seen. Some lymphocytic infiltrations were seen in the interlobular connective tissue. No tumors, bleedings or granulomas were found. In the *spleen* some stasis but no bleeding or infiltration of cells were found. The germinal centers were normally distributed, but with decreased cell content. *Lymph nodes* from the axillae and from the portal region were found to have normal architecture but with somewhat reduced cell content. No granulomas or pigment material were found. The *pancreas* and *other organs* were normal.

The wounds in the groins: The skin consisted of normal epithelium. In the subcutis several lymphocytes were found and recent bleeding was seen in the subcutaneous tissue on the right side. Using polarization microscopy, several insoluble birefringent elements, probably tablet residues were seen.

Toxicological analysis

Ethanol and *ketobemidone* were not detected in blood sampled from the femoral veins, while *diazepam* and *demethyldiazepam* were found in concentrations usual for therapeutical purposes (0.4 µmol/kg and 0.7 µmol/kg respectively).

Methadone was found in a concentration of 4.5 μmol/kg which is sufficient to cause severe or even fatal poisoning.

The *cause of death* was concluded to be poisoning with injected methadone, the poisoning probably being potentiated by the alterations in the liver and the recent infection. The *manner of death* was assumed to be an accidental overdose.

Discussion

Drug addicts often die young and one of the most common causes of death is by overdose either accidentally or in suicide attempts. The ratio of accident versus suicide has been shown to be 5:4 in a Danish study [1] and the number of drug addicts dying from an overdose increases with age [2]. Among the common causes of accidental overdose are the use of exceptionally pure drugs, use of drugs with impurities and injection of "the usual dose" after a period of abstinence [3].

Since 1970 all fatal cases of drug addiction in Denmark have been autopsied providing good information on the usual histological changes. Among the usual findings are lymphocyte invasion of the portal connective tissue of the liver [4], stasis and tablet residues in the lungs [5]. In this case, in addition to the usual findings, steatosis and fibrosis in the liver and a significantly enlarged spleen were found. The spleen had an appearance suggesting recent infection, thus supporting the information of a very recent disease with symptoms of infection.

Over a period of time most drug addicts destroy their veins by repeated injections at the same place and the use of nonsterile syringes [6]. The smaller veins and the most easily accessible veins are first affected and the addict must then use less accessible veins. In this case, fistulas were produced by repetitive injections at the same site thus giving rise to a permanent and readily accessible route for the administration of the drugs.

In this case it was not possible to accurately reconstruct the events leading to death. The information of disease during the last couple of days and the signs of infection strongly indicated that death was due to poisoning aggravated by the presence of disease. There was no macroscopic evidence of pneumonia and one section from each lobe of the lungs revealed only one small focus of pneumonia. No other focus of infection was identified. Although the enlargement of the spleen could not be explained by a trivial infection, no serological tests were performed. Apart from the generally increased risk caused by drug abuse nothing in the history suggested infection with hepatitis or HIV. The microscopical examination of the spleen and lymph nodes gave no evidence of malignancy. Even though the exact nature of the present disease was not determined, from a forensic point of view, it would suffice to conclude that the death was due to the intake of a quantity of drugs usually tolerated but this time complicated by infection and general weakness.

Conclusion

In this case the registered wounds or necrosis in the groins were initially considered to be older alterations without recent changes. Microscopical examination of the tissue revealed the presence of fresh bleeding and tablet residues in the tissue strongly indicating recent injection at this site. The case thus shows that poisoning should be suspected even in cases where no obvious fresh injection marks were found.

References

1. Kaa E (1987) Deaths from poisoning in Jutland 1981–85, Archive for Pharmaci og Chemi. Scientific Edition 15:50–64
2. Steentoft A, Kaa E, Worm K (1989) Fatal intoxication in the age group 15–34 years in Denmark in 1984 and 1985. Z Rechtsmed 103:93–100
3. Graw M, Haffner HT, Besserer K (1989) Todesfälle von Drogenkonsumenten: Suizid oder Unfall? Versicherungsmedizin 41:188–191
4. Kringsholm B, Christoffersen P (1987) The nature and the occurrence of birefringent material in different organs in fatal drug addiction. Forensic Sci Int 34:53–62
5. Kringsholm B, Christoffersen P (1982) Liver pathology in fatal drug addiction. Forensic Sci Int 20:141–151
6. Austin Gresham G (1975) Colour atlas of Forensic Pathology. Wolfe Medical Books, London