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Inadvertent epidural infusion of paracetamol in an elderly patient

Case Report

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Abstract: A 76 year old patient underwent a laparoscopic rectal resection performed under thoracic epidural anaesthesia and general anaesthesia. He was inadvertently given 1 g of paracetamol epidural and reported a position-independent holocephalic headache one day later. A severe nausea and vomiting lead to a gastrointestinal bleeding. The last neurological examination after 3 months revealed no nausea, no headaches and no sensory disturbances.

Keywords: *Paracetamol • Epidural application • Inadvertent*

Medical history

A 76 year old patient underwent a laparoscopic rectal resection performed under both thoracic epidural anaesthesia and general anaesthesia.

The patient was given a balanced anaesthesia with sevoflurane, sufentanil, and atracurium besylate. The thoracic epidural anaesthesia was carried out using a 19-gauge Touhy needle, employing the loss of resistance method with saline at a block height of T 9/10 and with a test dose of 2 ml 0.5% ropivacaine. The epidural space was punctured at a depth of 8 cm, and the catheter was advanced further by 5 cm.

At the end of the operation the patient was extubated with sufficient analgesia applied via an epidural catheter and transferred to the intermediate care station. The analgesia was performed intravenously with 6-8 ml/h 0.2% ropivacaine and additional administration of paracetamol and piritramid. On the **1st postoperative day** the patient was transferred to a regular ward.

Course

At 3 a.m., on the **2nd postoperative day**, the patient was inadvertently given 1 g of paracetamol via the bypass port for the ropivacaine (the three way stop cocks were used for re-filling ropivacaine).

The error was first noticed about four hours after the misapplication, even though the patient had been free of any symptoms up until that point.

The medication being received at the time the paracetamol was inadvertently applied included ropivacaine, losartan potassium and hydrochlorothiazide, amlodipine, metamizole, metoclopramide, cefuroxime, and metronidazole.

The ropivacaine dosing was interrupted, the catheter was left in situ until the 3rd postoperative day and the patient was neurologically monitored throughout the day, during which time no abnormal findings were observed. No other specific therapy was given.

Laboratory examinations revealed a discrete increase in white blood cell counts to 10,500/litre, with all the other parameters remaining normal.

On the **3rd postoperative** day the patient reported a position-independent holocephalic headache. There were no sensory or motor symptoms.

Magnetic resonance imaging of the spine was performed using contrast medium enhancement. There was no meningeal contrast medium enhancement, no intraspinal abscess formation, and there were no other abnormalities in the vicinity of the T10 vertebra (Figure 1).

Secondarily diagnosed problems included a multisegmented degeneration with a small paramedial left-lying and somewhat upwardly extending disc herniation at L4-5 with possible compression of the left L4 and multiple spondylarthritis.

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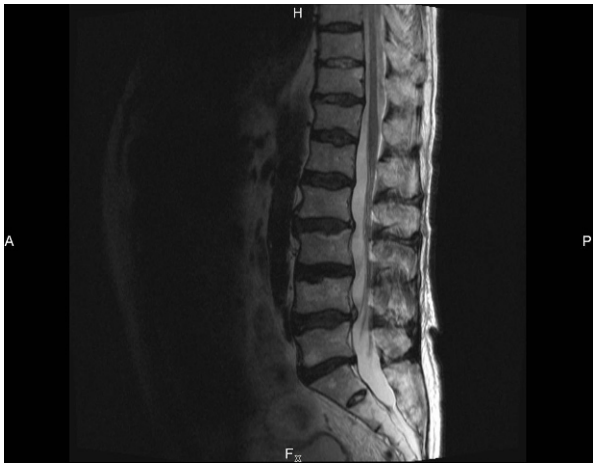

Figure 1. Magnetic resonance imaging of the thoracic and lumbar spine with contrast medium enhancement. No pathological alterations could be seen at the thoracic-lumbar transition.

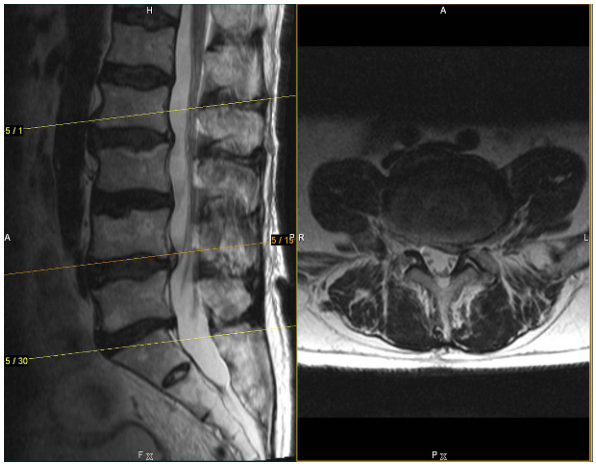

Figure 2. Magnetic resonance imaging of the lumbar spine with contrast medium enhancement. Left located, slightly upward reaching L 4-5 disc herniation with mild compression from L4 on the left.

Because of the patient's severe headaches and nausea, the patient was treated symptomatically with saline, ondansentone, and paracetamol intravenously. The severe nausea and vomiting could not be completely managed. The symptoms receded after a total of 24 hours.

On the **4th postoperative day** there was upper gastrointestinal bleeding. There were two fissural ulcerations in the distal oesophagus that were just below the Z line. The proximal ulcer revealed fibrin and coagulated blood deposits with a visible vessel, while the second distal elongate ulcer was covered with fibrin and lacked any signs of bleeding. The overall diagnosis was that the patient had suffered upper gastrointestinal bleeding, presumably from two small Forrest stage 2 A Mallory-Weiss lesions at the gastro-oesophageal junction. This bleeding was treated by applying submucosal adrenaline injections and two endoclips. These kissing ulcers appeared to be relatively large and were consistent with the severe vomiting observed despite the lack of any previous history.

As a result of the bleeding, haemoglobin fell initially to 13.4 g/dl and then later on to 12.6 g/dl. Despite this, the bleeding did not require any transfusions to be given. Simultaneously with this a hyponatremia of 133 mmol/l was observed which fell further to 131 mmol/l a day later. All other laboratory parameters were normal.

The control gastroscopy on the **6th postoperative day** revealed a cardiac insufficiency with signs of a stage II reflux oesophagitis immediately below the Z line, as well as the two already known fibrin covered and elongated mucosal lesions without any further signs of bleeding.

On the **8th postoperative day** there were sensory disturbances on the outer and front flanks of the left thigh. There was no pain in the affected areas and no motor disturbances were seen either. The proprioceptive reflexes in the legs were symmetric, but rather weak. It was assumed that there was a lesion of the left lateral femoral cutaneous nerve. Since the disorder was purely sensory, did not modify the reflexes, and no radicular pain existed, it seemed unlikely that these disturbances were associated with the secondary disc herniation (Figure 1).

Epicrisis

On the **12th postoperative day** the patient was transferred completely free of symptoms to a rehabilitation clinic.

The last neurological examination after 3 months revealed no nausea, no headaches, and no sensory disturbances on the left thigh.

Discussion

The incidence of erroneous application of medications when using an epidural catheter is probably underestimated. In a recently published review a large variety of drugs were shown to have been inadvertently applied epidurally, with most of these cases occurring in adults [1,2]. Erroneously applied medications, such as ephedirine, neostigmine, atropine, thiopental,

vecuronium, suxamethonium and midazolam, have widely differing effects according to the literature [3,4]. Only in two patients was a specific therapy involving epidurally injected steroids given [4,5]. In our case, because of the delay between the event and the time it was noticed, no causal therapy was attempted, and the only action that was taken was to leave the catheter in place after consultation with the manufacturer to applicate drugs like cortisone epidural. The entire asymptomatic period of 24 hours observed here was inconsistent with a case study of an adolescent who had already started suffering from headaches and nausea within two hours of inadvertent paracetamol application [6]. The post-epidural headache most often occurs after 24-48 hours post punction [7].

Furthermore, no reports have yet described gastrointestinal haemorrhages resulting from nausea and severe vomiting (due to drug misapplication) that were so severe that they required endoscopic intervention. The later observed sensory disturbances, which can not be explained easily either by the secondarily diagnosed disc herneation or the drug misapplication, is also a new observation.

Whether the headache and nausea, as described in the literature, represent a mechanical or a toxic complication, remains questionable considering the 24 hours the patient spent without suffering symptoms [6,8].

It is also unknown whether mass effects due to the 100 ml volume in the epidural space should have had an impact on neurological symptoms, since epidural pressure changes are no longer likely to be relevant after 24 hours.

The possibility of a secondary perforation of the dura by the epidural catheter is given, but the position of the catheter was proved semi-daily.

The injection mix-up may can occur if the epidural and central venous catheters are lying on the same side of the patient. A faulty connection can arise if the epidural catheter is not adequately labelled. This meant that instead of the line of the central venous catheter, the line of the epidural catheter can be used for applying the paracetamol.

Consequences for clinical practice

Despite good and specialised training in the use of venous catheters and a dedicated Acute Pain Service which only handled epidural catheters is postulated. This incident happened even though a special filter in the epidural line was used to mark it and colour sticker marked the line. Ropivacaine was applicated with a special pump (CADD-Legacy^{R} PCA), but the weak point was the use of a three way stop cocks in the epidural line for re-filling of the medicament. Additionally the incidedt occurred in the night. The working conditions were not optimal with only little night to let the patient sleep.

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Competing interest

There were no conflicts of interest. The corresponding author assures that there were no associations with any company whose product was mentioned in this article, or any company that sells any competing products. The presentation of the topic was independent and the representation of its content was not biased towards or against any specific product.

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