

**Case Report / Olgu Sunumu**

## A Severe Complication of Accidental Epidural Administration of Glutaraldehyde

### *Glutaraldehydin Kazara Epidural Uygulanmasının Ağır Komplikasyonu*

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In a patient operated for left femoropopliteal bypass under epidural anesthesia, 3 ml of 3% glutaraldehyde solution was administered through the epidural catheter at the postoperative sixth hour accidentally. Following glutaraldehyde administration, the patient developed paraplegia in addition to systemic symptoms such as hypotension, tachycardia, nausea and vomiting. At the end of the first year, neurologic symptoms didn't improve despite medical treatment and rehabilitation program.

**Key words:** Glutaraldehyde; epidural; analgesia; paraplegia.

Epidural anestezi altında sol femoropopliteal bypass uygulanan hastaya ameliyat sonrası altıncı saatte epidural kateter yoluyla kazara 3 ml %3 glutaraldehyd solüsyonu uygulandı. Glutaraldehyd uygulamasını takiben hastada hipotansiyon, taşikardi, bulantı ve kusma gibi sistemik semptomlara ek olarak parapleji gelişti. Bir yıllık medikal tedavi ve rehabilitasyon programı sonunda nörolojik semptomlarda iyileşme olmadı.

**Anahtar sözcükler:** Glutaraldehyd; epidural; analjezi; parapleji.

The use of epidural anesthesia and analgesia is a frequently preferred technique because of its advantages at both perioperative and postoperative periods. The catheter placed at the epidural space is usually left in place for control of postoperative pain. Although postoperative analgesia improves patient's comfort and shortens healing period, it also carries some risks. Rarely, some complications may be observed related to this technique.<sup>[1-5]</sup>

We examined the clinical status in this patient following glutaraldehyde administration in accordance with literature data which is not defined previously.

### CASE REPORT

A 72-year-old male patient with atrial fibrillation rhythm admitted to hospital with a complaint of intermittent claudication at a hundred meters of distance. At his magnetic resonance angiography (MRA), we observed a total occlusion of left superficial femoral artery at its middle segment and collateral filling at the popliteal artery (Fig. 1a).

Under aseptic conditions, we placed an epidural soft catheter (Perifix Soft Tip 701 Filter Set, Braun, Germany) from L3-L4 level at sitting position. Left femoropopliteal bypass operation

was performed with 8-mm full ringed polytetrafluoroethylene vascular graft (Goro-Tex Stretch Vascular Graft, Arizona, USA) under epidural anesthesia maintained by 20 ml bupivacaine (Marcaine %0.5 flacon, AstraZeneca, Istanbul, Turkey) performed through this catheter. The epidural catheter was left in place for postoperative analgesia. At the postoperative sixth hour, we administered 3 ml bupivacaine + 3 ml serum physiologic from the epidural catheter for the relief of postoperative pain. Ten minutes after drug administration, the patient developed sudden hypotension, tachycardia, nausea, vomiting and cold sweating. After examining the last drug administration with details, we realized that the drug in the bupivacaine flacon was emptied and it was filled with 3% glutaraldehyde solution. We found out that 3% glutaraldehyde solution was administered instead of bupivacaine from the epidural catheter. The first neurologic examination revealed that the muscle tonus at right thigh flexor group was 2/5, and at the remaining 1/5. The patient had left lower extremity plegia and hypoesthesia starting from L1 dermatome. There were no patellar

or Achilles reflexes and Babinski sign was negative on both lower extremities. Perineal sensory, anal tonus, anal reflex, bulbocavernous reflex and cremasteric reflexes were lost. Abdominal skin reflex was present. We started 16 mg/day dexamethasone intravenously in addition to other supportive treatment.

We observed disc bulge at dural sac at L4-L5 level and hypertrophy of flaval ligaments at lumbar magnetic resonance myelography examination (Fig. 1b).

We couldn't get any response at sensorial evoked potential (SEP) records from the right and left tibial malleoli at electromyographic (EMG) examination. Doppler ultrasonography showed that the left femoropopliteal bypass graft was patent.

The patient was immediately taken into early rehabilitation program. By the end of one-year rehabilitation program, control EMG showed no records at both sural, tibial and peroneal nerves. At both lower extremities, L3-L4-L5 and S1 sensory and motor functions were evaluated as 0/5. There were no deep tendon reflexes, Babinski



Fig. 1. (a) Preoperative angiographic image of the patient. (b) Lumbar magnetic resonance myelography image after epidural glutaraldehyde administration.

sign was bilaterally positive. There was no anal tonus and anal reflex.

## DISCUSSION

Epidural anesthesia and analgesia serve important advantages in peripheral arterial vascular surgery by enhancing arterial and venous blood flow at the extremity due to administration of local anesthetic drugs performed through this catheter. The efficacy of epidural analgesia in reducing postoperative pain, response against stress, pulmonary and cardiac complications are the main reasons for preferring this technique.<sup>[1,3-5]</sup> We also preferred epidural anesthesia in this high cardiac risk patient in order to avoid complications of general anesthesia.

Serious complications after epidural analgesia may be due to misplacement of the catheter or needle, infection, anaphylactic reactions, space-occupying lesion or direct needle trauma.<sup>[2,3,5,6]</sup> We couldn't find any literature data as in our case even in rare complications of epidural anesthesia. In our case, we completed left femoropopliteal bypass operation without any complications under epidural anesthesia, but glutaraldehyde was accidentally administered in order to relieve postoperative pain.

Glutaraldehyde may be used in cardiac surgery for preparation of cardiac valve prosthesis or pericardial patch under control.<sup>[7,8]</sup> As already known, 2% glutaraldehyde solution may be used for disinfection and sterilization against viruses and bacteria. Also 3-6% solutions of glutaraldehyde is used for fixation of tissue samples for electron microscopic examination. Glutaraldehyde may cause ophthalmic, skin and pulmonary system irritation in laboratory workers. Also glutaraldehyde used in sterilization of endoscopic materials may cause serious necrosis if not removed from the environment totally.<sup>[9]</sup>

In our patient, ten minutes after glutaraldehyde administration through the epidural space, the patient developed systemic symptoms as hypotension, tachycardia, nausea, vomiting and cold sweating. These symptoms continued for around one hour and disappeared with supportive treatment. Kietzmann et al.<sup>[10]</sup> reported that

drugs administered from epidural catheter reach their maximum plasma concentration in ten minutes. We thought that the systemic effects ten minutes after glutaraldehyde administration may be due to passage into systemic circulation via diffuse venous structures in the epidural space.

The chemical detrimental effect of glutaraldehyde starts in few minutes especially on proteins. The injury after glutaraldehyde administration will be great since it has no antidote and early surgery doesn't improve the neurologic status. Since the drug administered from the epidural catheter can neither be aspirated back nor neutralized, glutaraldehyde already fixed all neural tissue at the lumbar region and resulted in that clinical status.

As a result of local effect at the epidural space, irreversible nerve injury had occurred under L3 level. We didn't observe a neurologic healing in one-year follow-up compared to early neurologic findings. We already thought that expecting the healing of neural damage caused by a strongly irritating drug like glutaraldehyde is a highly optimistic idea.

The sensory and motor functions didn't improve after one-year rehabilitation program in this clinical status resulted from a very serious mistake. Rehabilitation program only helped progression in the ability to use the wheelchair by strengthening the upper extremity muscles.

In conclusion, glutaraldehyde administration through epidural space has both local and systemic effects. Systemic effects may be controlled by supportive treatment, and also early rehabilitation program may be beneficial because of the permanent neural damage. Another important issue is to remind that chemicals other than drugs must be kept away from drug fridges.

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