

A Medicolegal Approach to the Intraoperative Large Vessel Injury of Herniated Lumbar Discs

ABSTRACT

OBJECTIVE: The objective of the present study is to display the significance of early intervention in large vessel injury associated with surgery of herniated lumbar disc and demonstrate how the complications of vessel injuries are evaluated by medical experts.

METHODS: Our study was based on a retrospective review of the six cases which were claimed to be associated with large vessel injuries defined as life-threatening complications during herniated disc surgery among 40 neurosurgical cases presented to the Third Special Board comprising medical experts for medical malpractice in the Institute of Forensic Medicine between 1998 and 2005.

RESULTS: The courts referred these six cases to the Institute of Forensic Medicine in order to determine whether the neurosurgeons performing the surgery were negligent in the intraoperative large vessel injuries of herniated disc. The pertinent Special Board of the Institute of Forensic Medicine (IFM) decided that the practice in five of the six cases was not within the range of medically permitted risk, and the neurosurgeon was negligent while no negligence was found in one case.

CONCLUSIONS: It is essential for neurosurgeons to always keep in mind that early intervention saves lives when such complications arise and fully inform the patient or the legal representatives about the risk associated with the treatment before the intervention and obtain their informed consent in writing. In case of a medical malpractice which is not included in the medical risks accepted by the medical science of neurosurgery, it is inevitable that the surgeon will be found negligent in spite of the presence of an informed consent.

KEY WORDS: Neurosurgery, Vessel Injury, Medical Malpractice, Forensic Medicine

INTRODUCTION

Although injuries other than of disc compartments are uncommon in herniated lumbar disc surgery, it is known that they may occur within the range of accepted complications (1, 2). However, in standard surgery for lumbar disc herniation, a neurosurgeon is expected to anticipate complications, when they are within the range of accepted risk, and take necessary preventive measures. The mortality and morbidity rates of a complication depend on its early diagnosis. An early diagnosis of the complication has also an influence on the success of the treatment and prevention of the resulting defect (3 - 15). It is common for a complication to be regarded and accepted as negligence

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of standard medical practice by others but not by the neurosurgeons. Vital complications resulting from such surgeries include visceral organ and vascular injuries (5, 4, and 8).

Each medical intervention has its own accepted risks, and Turkey has adopted international medical standards. Surgeons are obliged to fully inform their patient about all the risks associated with the surgery even if they have a low incidence and then obtain an informed consent from their patient within the framework of both international and domestic laws (1, 2, 9, and 16). The negligence (medical malpractice) in a risky procedure is the damage occurring as a result of failing to notice the development of an complication or failing to prevent and follow standard medical practices despite noticing it (2, 10).

Any claim for medical malpractice associated with a medical intervention by a patient and his/her relatives must be reviewed and evaluated by a council comprising physicians. Any other constitution may result in incomplete interpretations (2, 4, 9, and 16).

The objective of the present study is to display the significance of early intervention in large vessel injury associated with surgery of lumbar disc herniation and demonstrate how the complications of vessel injuries are evaluated by medical experts.

MATERIAL AND METHOD

There are two institutions in our country which are accepted as possessing medical expertise by a court of law; the Supreme Council of Health under the Ministry of Health and the Institute of Forensic Medicine under the Ministry of Justice. Both councils consist of medical specialists. The Supreme Council of Health and the pertinent Special Board of the Institute of Forensic Medicine meet monthly and three times a week, respectively. If the courts of law are not satisfied with these institutions, they can also consult the relevant medical faculties of the universities or related associations of specialists for further expertise.

Our study includes a retrospective review of the cases with intraoperative large vessel injuries of lumbar disc herniation between 1998 and 2005, where the neurosurgeons performing the operations had been sued. Related to these cases, the courts consulted the Third Special Board of the Institute of Forensic Medicine to determine if the operating neurosurgeons were negligent in the intraoperative

large vessel injuries of herniated lumbar disc. There were six cases that met study criteria during the seven-year period. The outcomes of the expert reports were collected, including the sociodemographic characteristics and related medical history.

RESULTS

We determined six cases which were taken to the court due to intraoperative large vessel injuries of lumbar disc herniation during our study period of seven years. All of the patients were female, with an age range of 23 and 56 years. Review of autopsy and medical documents revealed that there was arterial injury in five cases, and one of the cases had injury to both artery and vein. Four of the six cases underwent surgery for disc herniation in of L4-5, one of L4-5 together with L5-S1 and one of L3-4. The patient with L3-4 disk herniation underwent microdiscectomy while the other five patients were treated by hemilaminectomy-discectomy. Abdominal hemorrhage was seen during the microdiscectomy operation in L3-4 disc herniation; therefore the patient was turned back, undergoing laparotomy and due to damage in the aorta, vascular grafting was performed by cardiovascular surgeons and the wound was repaired. The patient was treated and discharged from the hospital. In two of the other five cases, it was determined that they died because of the complications from renal failure and influence on hemoperfusion of the organs due to hypovolemia although abdominal iliac artery injury was diagnosed within 24 hours in one case and within 12 hours in another and was repaired accordingly. The autopsy of other three patients who went undiagnosed and had died 3, 6 and 16 hours after the operation respectively showed injury to iliac artery, and additionally injury to the iliac vein and omentum in one patient, and confirmed that the cause of death in those three cases was organ failure due to hypovolemia.

Review of court and hospitalization files revealed that the informed consent forms which were obligatory to obtain before the surgery were absent in five of the six cases. Also, documents for postoperative routine follow-up were not available in two of the five patients who had intraoperative large vessel injury and died. Furthermore, it was concluded that the necessary procedures and professional care had not been provided for the three patients who died 3, 6, and 16 hours after the surgery. These conclusions are shown at Table I.

Table I. Summary of medicolegal cases.

No	Age/Sex	Diagnosis	Operation	Complication	Recognized	Repair	Outcome	Complaint	Verdict	Specialty
1	23/F	Left herniated disc, L4-5	Hemilaminectomy Discectomy	Injury to left iliac artery	No, delayed 24 hours	Yes, graft by vascular surgeons	Death, survived 30 days	Failed to provide standard of care	Settlement	NS
2	44/F	Left herniated disc, L4-5	Hemilaminectomy Discectomy	Injury to left iliac artery	No	No	Death, survived 6 hours	Failed to provide standard of care	Settlement	NS
3	38/F	Right herniated disc, L4-5	Hemilaminectomy Discectomy	Injury to left iliac artery and vein	No, 16 hours delay	No	Death, survived 16 hours	Failed to provide standard of care	Settlement	NS, VS
4	48/F	Left herniated disc, L4-5, L5-S1	Hemilaminectomy Discectomy	Injury to right bifurcation of common iliac artery	No, delayed 1 hour	No	Death, survived 3 hours	Failed to provide standard of care	Settlement	NS
5	40/F	Left herniated disc, L4-5	Hemilaminectomy Discectomy	Injury to left iliac artery	No, 12 h delayed 1 hour	Yes	Death, survived 1 day	Failed to provide standard of care	Settlement	NS, VS
6	56/F	Left herniated disc, L3-4	Hemilaminectomy Discectomy	Injury to aorta	Yes	Yes	Survived	Failed to provide standard of care	For defense	NS

NS: Neurosurgeon, VS: Vascular surgeon.

DISCUSSION

Most of the neurosurgeons performing lumbar disc herniation surgery do not anticipate any rare complications such as large vessel and organ injuries. The incidence of injury to large vessels in surgery for lumbar disc herniation is 1-5/10.000 (8, 6, and 22). The mortality rate is significantly reduced with early diagnosis and the use of effective treatment methods. The major issue in this complication is that the surgeon must always keep the risk in mind, and follow necessary intraoperative and postoperative procedures (5, 7, and 14). In one of our six cases, the patient survived due to early diagnosis of the complication and performance of necessary treatment so that the neurosurgeon was not found negligent. However, all the other five patients were lost because of similar complications, and the neurosurgeons were found negligent due to inattentiveness, improper care and misconduct.

The term "conscious negligence" which was defined as "in case an event occurs against perpetrator's will" under the Article No. 21 and 22 of the Turkish Penal Code is a little confusing for medical practices. Each medical practice has a

particular "accepted risk". Therefore, physicians should be prepared to experience complications during their medical practices. The most important factors in this respect are as follows; the procedure must be carried out by a physician, an informed consent must be obtained from the patient before the procedure and the medical intervention must be within the scope of medical standards (1, 9, 16). When all these conditions are met, legal practitioners are supposed to state that the procedure is performed in accordance with the law without any further interpretation. However, physicians are judged as if they acted illegally because of the different interpretations between judges and public prosecutors and their hesitation in taking care of paperwork. Studies so far have shown that the conclusion of medical experts was that the practice was correct in 60% of the cases where a claim was made on grounds of medical malpractice (11).

In lumbar disc surgery, the most frequently injured artery is the left common iliac artery, which is anatomically located in the anterior of L4-5 lumbar disc distance (3, 5). As seen in one of the patients in our series, there is a risk of injury to the aorta during

L3-4 discectomy. Other injuries can occur in the right iliac artery, inferior vena cava, iliac vein and branches of iliac vessels and bridging veins. Although rare, arteriovenous fistula (AVF) and pseudo-aneurysm have also been reported as late complications (17, 18).

The procedure results in scarring since vessels are injured while passing behind the anterior longitudinal ligament (ALL) by means of a curette or rongeur used for discectomy. The major predisposing factors a brain surgeon must know are degeneration of the ALL defect and anulus fibrosis, the prevertebral structures' adherence to ALL following an abdominal surgery, and difficult surgical conditions such as secondary surgery or inappropriate surgical positioning. Yet, it should be well known that vascular injury can occur even under very skillful hands or under very convenient conditions during disc surgery (19, 20).

Early diagnosis of vascular injury is vital because of the 80% mortality rate. The rate may vary depending on the time of detection of the injury, type of damage, size of vessel, and presence of concomitant visceral organ or other structural injuries (21). Therefore, the injury may immediately be detected or may go unnoticed for years. Unexpected hypotension, residual piece of vessel or organ in the rongeur or forceps, sudden blood pressure decrease, rapid blood flow into the disc area should raise concerns about abdominal large vessel injury. However, findings may sometimes not be indicative of the severity of the injury. A young, healthy patient can tolerate a blood loss around 30-40%. This is particularly true in damage to veins (22, 23).

Abdominal distension following vascular injury may be accompanied by nausea and vomiting. However, such findings are common in the postoperative period. In our cases, two patients who died within the first 24 hours had nausea, vomiting and abdominal distension during the postoperative period (21). The diagnosis may be delayed with arteriovenous fistula (AVF) and pseudo-aneurysm. High cardiac output or lower extremity edema following lumbar disc surgery may be a finding of chronic AVF. This is usually an important finding for diagnosing vessel complications if seen in a patient with a recent history of lumbar disk surgery (5, 6).

Diagnosis of large vessel injuries following lumbar discectomy varies depending on the imaging method. However, if the neurosurgeon is suspicious about an abdominal vessel injury, urgent laparotomy is indicated together with a vascular surgeon (20).

During the autopsy of five dead cases, injury to artery and vein (in one patient) was detected; however the predisposing factors were not explained.

The patient and his /her legal representatives, who suffered from medical malpractice, can naturally claim that the damage is a result of negligence, improper care or professional incompetence of the physician. However, whether the practice was performed within scientific standards or not is something which shall be determined by the Supreme Council of Health or Institute of Forensic Medicine, which are assigned as medical experts by the court of law. They shall investigate the presence of negligence, inattentiveness and improper care regarding the damage that occurred as a result of medical practice. They will then conclude whether an event which was defined as a complication by the science of neurosurgery is actually malpractice or not (2, 9, 16).

The predisposing factors of the patient are effective in the resulting damage in many cases of damage described as complications in surgical applications. Regarding the outcomes resulting from surgical intervention, such personal causes can be understood only by means of an autopsy (9). In five cases that underwent autopsy, it has been reported that the deaths were as a result of vascular injury; however no information has been provided about any predisposing factors.

In the present cases, the decisions about the negligence of the neurosurgeon were made depending on the contradiction of law related to the absence of informed consent before the surgery, and also negligence and inattentiveness related to failure to perform postoperative follow-up procedures in accordance with standard medical practices.

In conclusion; the Turkish Penal Code, which became effective on June 1, 2005 brought a different dimension to the physician-patient relationship together with many changes in the society. Neurosurgeons have to obtain the informed consent of their patient in writing for any kind of intervention. This is essential for medical practices'

conformity with the law. Neurosurgeons must always keep in their mind that early intervention in such complications is life saving and fully inform the patient or patient's legal representatives about the potential risks of the surgery and obtain their informed consent. In spite of the presence of informed consent, it is inevitable to be charged for negligence in case of malpractice which is not included in the range of acceptable risk by the medical science of neurosurgery. According to the legal practice in Turkey, a neurosurgeon who is found negligent in the death of a patient can be charged with a penalty of imprisonment between 2-6 years depending the degree of negligence or with a substitute penalty; he/she may also be confronted with a temporary (up to 6 months) or permanent disqualification by the Turkish Medical Association.

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