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Case Report

Retained Fractured Knife Blade: Unexpected Intraoperative Complication of Lumbar Discectomy: Report of an Event with a Technical Suggestion

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Abstract

Background: Lumbar discectomy is a common neurosurgical procedure for the treatment of lumbar disc prolapse after failure of conservative management. The rate of complications is increasing recently due to the increased frequency of these surgeries.

Case description: A 35-year-old-male presented to the emergency room with severe right lower limb pain radiating to the foot for about six months. MRI was performed and revealed L3-4 disc prolapse on the right side. Open laminectomy and discectomy were performed and a large disc fragment was removed from L3-4 space. While doing a discectomy, the blade of the knife was broken inside the disc space. After several unsuccessful attempts to extract the blade, using live fluoroscopy, the blade was removed.

Conclusion: Intradiscal retained foreign bodies have early and delayed surgical complications that might be catastrophic. Surgeons should assess the safety of the surgical instruments before doing surgery. Removal of a broken knife blade is important to avoid the complications.

Keywords: Lumbar discectomy; Neurosurgery; MRI; Knife blade

Introduction

Lumbar discectomy is a valid treatment for lumbar disc prolapse after failure of conservative management. Several surgical techniques are used for lumbar discectomy. The annulus part of the disc is usually incised by No 11 blade. One of the uncommon complications of this surgery is a part of an instrument being retained in the disc space [1]. The consequences may be deleterious especially if the retained part is smooth, sharp, slippery or contaminated. Moreover, the retained piece can migrate deeply in the disc space, reach the retroperitoneal space or even penetrate the viscera [2,3]. There may be several difficulties removing the retained blade using different removal instruments such as forceps, hemostatic artery or discectomy forceps especially when it migrates deeply in the disc space. Repeated unsuccessful attempts to retrieve the migrating instrument piece will push it deeper and may lead to catastrophic complications as a major vessel injury [4,2]. In the field of surgery, retained foreign body related complications are well known, however, in discectomy surgery, these cases are underreported [5]. There is no general consensus in the literature about the management of these situations [1,6,7]. Herein, we present a case of successful retrieval of a deeply located broken blade by live fluoroscopic imaging during the procedure of open discectomy.

Case Presentation

A case of 35-year-old-male presented to the emergency room with severe right lower limb pain radiating to the foot for about six months. By examination, no neurological deficit was observed except for L3-4 distribution hypoesthesia. MRI was performed and revealed L3-4 disc prolapse on the right side (Figure 1). Patient was prepared for surgery. Open laminectomy and discectomy were performed. A discectomy was attempted using a blade No 15. When the scalpel was returned back to the scrub nurse, it pointed out that its tip was avulsed. We were able to determine the location of the blade piece using fluoroscopy. Several attempts were made to retrieve the blade, but with repeated manipulation, the blade moved deeper. Under live fluoroscopy guidance and using the discectomy forceps (Figure 1), we were able to remove the blade keeping the pars and facet joints intact, and the postoperative course was uneventful.

Discussion

In 1994, Amirjamshidi et al. [1] described the first case series of a retained broken knife blade within the disc space. Due to medicolegal issues, there is underreporting of such complications [8]. Not only are blade tips broken, but other instrument breakage such as curette cups, rongeur tips has been reported [5,9]. The dislodgment of any separated part of the instrument into the disc space may have immediate or delayed complications. This may range from foreign body granuloma or abscess to major vessel perforation [6,8]. Moreover, the retaining of a metal foreign body may hinder the ability to obtain future MRI as a main diagnostic spine tool. Several trials to remove the metal object may complicate the surgical procedure causing durotomy, infection, CSF leak and nerve root iatrogenic injuries [10].

The decision to remove the retained metal piece or to keep it is detrimental for both the patient and the surgeon. Sufficient evidence in the literature suggests the importance of removal of the foreign body over retaining it [1-4,6]. In this case report, we tried to remove the broken knife in the same surgery session. Several attempts using the discectomy forceps were made to adjust the position of the blade under fluoroscopic guidance until we managed to remove it. There

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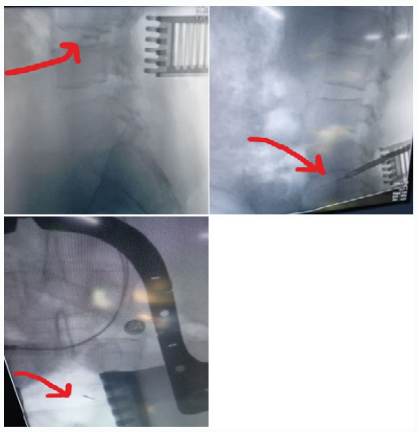

Figure 1: The scalpel blade is entrapped in the L3-4 disc space both lateral and AP view.

is no uniform method in the literature on how to extract the broken instrument pieces from the discectomy site Figure 2. Rahimizadeh et al. [11] described the transforaminal approach for extracting a broken blade in the disc space. Koutserimpas et al. [12] used a robotic-assisted laparoscopic surgery to remove a broken blade near the internal iliac artery. A migrating scalpel into the heart after posterior lumbar interbody fusion was extracted through a median sternotomy [4]. Aznarez et al. [13] performed a lateral transpose as approach to extract a retained foreign body after lumbar discectomy. Rahimizadeh et al. [14] also utilized the extended extraforaminal approach that has a better visualization field to extract an intradiscal surgical blade [15]. Table 1 lists the available case reports of retained surgical instruments in the disc space and the different lines of management.

For spine surgeons, meticulous care should be taken when using the discectomy knife and surgeons should check the integrity of instruments before proceeding for surgery [16,17]. Proper detection of instrument fatigue, cracks and proper fixation is the responsibility of hospital administration, medical store officials, scrub nurses, and also the surgeon [18-20].

Technical Suggestion

Most surgical instruments, including forceps, clamps, scissors, and retractors, are made from mixtures of metals such as iron, cobalt, nickel, and alloys such as steel. Therefore, these instruments can be magnetized.

Facing this intraoperative surgical problem, a magnetized instrument handle can be designed to be used to pick the broken parts of different instruments dislodged in deep surgical sites as a broken knife blade, broken rongeur. The magnetic power of the handle should not be affected by conventional surgical sterilization methods such as autoclaving. Sterilization procedures may be compromised by magnetization of instruments, a problem that should be solved. This magnetized instrument will be available all the time in case of events like that happening intraoperatively, it can be used to pick up broken tool segments from disc spaces.

Conclusion

Here, we report a case of a retained blade of a discectomy knife in the disc space. Proper management of this intraoperative problem will prevent immediate and delayed complications which may be dreadful. Reporting of this event is important for both the patient and the surgeon.

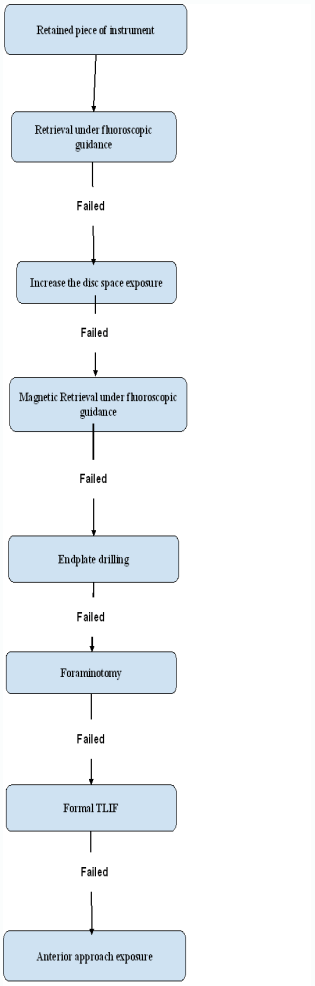

Figure 2: Simple flowchart for the extraction of a broken piece of instrument inside lumbar disc space.

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Table 1: List of similar case reports of broken instrument parts inside the disc space.

Authors	Level	Instrument Retained	Investigation	Location of the piece	Complication	Removed during 1ry or a second surgery	Surgical Approach
Amirjamshidi et al. [1]	NM	Knife Blade	X-ray	In close relation to the internal iliac arteries	No	Second Surgery	Anterior retroperitoneal
Rahimizadeh et al. [11]	L4–L5	Knife Blade	Fluoroscopy	Far laterally in the disc space	No	Second Surgery	Microscopic transforaminal
Rahimizadeh et al. [14]	L4-L5	Knife Blade	3D reconstructed CT scan	Anterolateral part of the disc space	No		Extended extraforaminal, with microscope
Barbero-Aznarez et al. [13]	L4-L5	Knife Blade	Fluoroscopy and CTA	Close vicinity to the iliac vein	No	2nd Surgery	Paravertebral, lateral transpsoas approach
Goh et al. [17]	L5/S1.	Knife Blade	Fluoroscopy	Anterior to the anterior longitudinal ligament	No	In the same primary surgery	Microsurgical extraction
Koutserimpas et al. [12]	L4-L5	Knife Blade	Fluoroscopy and CTA	Anterior to the lumbar spine at the L4/L5 level and to the left of the aorta	No	In the same primary surgery	Robot-assisted laparoscopy
De Praetere et al. [4]	L5/S1	Knife Blade	Spiral computed tomography	Junction of inferior vena cava and right atrium	Migration	2nd Surgery	Median sternotomy
Agrawal et al. [16]	L1-L2	Knife Blade	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach with a microscope
Zheng et al. [3]	L4-L5	Knife Blade	Fluoroscopy and arthroscopy	In the disc space	No	In the same primary surgery	Posterior approach under arthroscopic guidance
Limbachia et al. [2]	L5-S1	Knife Blade	CT scan	Medial to the left common iliac artery,	No	2nd Surgery	Laparoscopic retroperitoneal
Tiwari et al. [15]	L4 – L5	The jaw of a discectomy forceps	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach with a microscope
Menger et al. [9]	L5-S1	Pituitary Disc Rongeur	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach
Kale [18]	L5-S1	Tip of the pituitary forceps	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach
Lee et al. [19]	L4/L5	Pituitary Rongeur tip	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach
Ramachandran et al. [20]	L4-5	Pituitary rongeur tip	Fluoroscopy	In the disc space	No	In the same primary surgery	Posterior approach

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