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BROKEN BLADE TIP IN LUMBAR DISC SPACE RETRIEVED VIA ANTERIOR TRANS-ABDOMINAL APPROACH: A RARE BUT POTENTIALLY DEVASTATING COMPLICATION OF LUMBAR SPINE SURGERY.

Orthopaedic

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ABSTRACT

Purpose: Breaking of scalpel blade inside a disc space during lumbar spine surgery is a seldom reported potentially fatal complication. We report a case of broken number 15 scalpel blade during lumbar transforaminal lumbar inter-body fusion (TLIF) surgery, retrieved via anterior trans-abdominal approach.

Methods: The tip of a number 15 scalpel blade was broken inside the L3-L4 disc space and all efforts to retrieve the broken fragment were in vain. The help of a general surgeon was sought and the fragment was successfully retrieved via transabdominal approach to retroperitoneum. A review of previous such case reports is also presented.

Results: A transabdominal approach was used and retroperitoneum was entered below the level of aortic bifurcation. The sharp fragment was felt just below the left common iliac artery and was grasped out carefully. Patient tolerated the procedure well and the post-operative period was uneventful. Patient was discharged 8 days after surgery and had satisfactory improvement in her back pain and radiculopathy related symptoms.

Conclusion: The anterior transabdominal route provides a potential solution for anteriorly displaced blade fragment during lumbar disc surgery when posterior transforaminal route fails to retrieve it. While entering the disc space with a number 15 blade, one should be careful not to rotate the blade within the disc space and avoid grating against the sclerotic end plate.

KEYWORDS

foreign body; broken blade tip; lumbar spine surgery; complication.

Introduction

Scalpel blades carry the risk of breakage in any surgical procedure. Such a situation can be really troubling during a spine surgery, due to narrow corridors and vital neural structures in vicinity. Sharp injury to neurovascular elements due to a retained blade can be a devastating complication, both for the surgeon and the patient. Also, the medicolegal implications are significant. Rarely, the blade may get entrapped in the narrowed disc space if broken inside the disc space, and retrieval is quite difficult for such a small size foreign body. While most of the times the blade or its fragments can be retrieved under direct visualization, there can be failure to do so when the blade or its fragment has penetrated deep enough to limit direct visualization. Only six such cases in three case reports have been reported so far in the literature [1-3]. In all reported cases, the broken blade could not be retrieved during the same surgical sitting and hence a second procedure was done to remove the blade in a different surgical sitting[1-3].We report a case where a broken blade fragment was retrieved during the same surgical sitting using anterior transabdominal approach. To the best of our knowledge, this has not been reported so far in literature.

Case Report

A 65-year-old female with degenerative disc disease at L3-L4 and L4-L5 levels and features of lumbar canal stenosis was planned for posterior decompression and two level transforaminal lumbar inter-body fusion (TLIF). A standard midline posterior approach was used and bilateral pedicular screws were inserted at L3, L4 and L5 level. While preparing the disc space at L3-4 level, the number 15scalpel bladewas used to enter into the L3-L4 disc space anddiscectomy done with disc forceps. When the scalpel was returned back to the scrub nurse, he immediately pointed out that tip of returned scalpel is broken. Intra-operative fluoroscopy confirmed the presence of blade tip in L3-4 disc space (Figure 1).

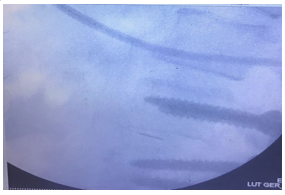


Figure 1: The blade fragment is seen in L3-L4 disc space with sharp edge pointing anteriorly.

We were not able to directly visualize the tip and all our efforts to retrieve it with use of intraoperative imaging and operating microscope were in vain. Moreover, it was evident from intra-operative imaging that the sharp end of the blade fragment had penetrated the disc space and was pointing anteriorly(Figure 2). Immediately, we abandoned our efforts to retrieve it from posterior approach. A general surgeon was called in and a combined decision was made to proceed for blade removal via trans-abdominal approach. This decision was taken to avoid further migration of tip with a potential vascular complication. Careful interbody fusion with cage was done under image guidance and wound was closed. Before proceeding to laparotomy, the attendants of the patient were informed about the complication, andneed for a second surgical procedure.

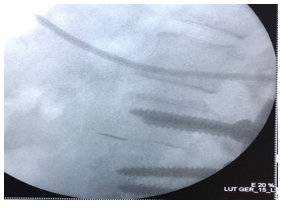


Figure 2: The blade fragment can be seen displaced anteriorly with a likely breach of anterior longitudinal ligament.

Patient was positioned supine and anterior midline abdominal incision was made. A transabdominal approach was used and after retracting bowel loops, retroperitoneum was entered below the level of aortic bifurcation. The approximate location of blade was confirmed in AP, lateral view and oblique view under image intensifier guidance.The blade fragment was located on left lateral most part of L3-L4 disc space region on AP view and in the region of anterior longitudinal ligament in lateral view(Figure 3). The broken blade was then readily felt with fingertip after dissecting through the region approximate location marked under image intensifier. This sharp fragment was just below the left common iliac artery and was grasped out carefully(Figure 4). Wound was closed in layers after hemostasis and thorough saline

lavage. Patient tolerated the procedure well and the post-operative period was uneventful. Patient was discharged 8 days after surgery and had satisfactory improvement in her back pain and radiculopathy related symptoms.

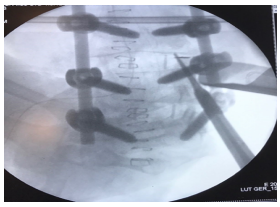


Figure 3: Using transabdominal approach to retroperitoneum, the approximate location of blade fragment was marked. The fragment is seen in left lateral most part of L3-L4 disc space.

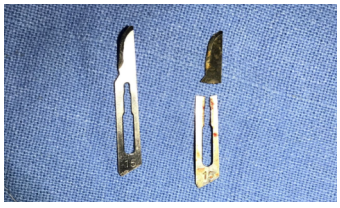


Figure 4: The broken fragment of number #15 scalpel blade was successfully retrieved via transabdominal approach to retro peritoneum.

Discussion

Metallic foreign bodies have been shown to undergo extensive rusting and corrosion in the human body. In addition to release of metal ions in circulation, the metallic foreign bodies may exhibit extensive local inflammatory reaction and granuloma formation [4,5]. These metallic foreign bodies tend to migrate with normal body movements and carry potential risk of injuring adjacent structures[1-3,6]. When the metallic foreign body is a sharp blade fragment, it is obviously more dangerous. While such cases can have medico-legal implications, the literature seems to be deficient in this regard.

During lumbar discectomy procedure, a 15 number blade is commonly used to rupture the posterior longitudinal ligament and outer annulus in order to remove the disc material[7,8]. Degenerative disc disease leads to narrowing of the disc space and is associated with end plate sclerosis[9], therefore while rotating the blade inside the disc space the blade might get caught in the stenotic disc space and forceful maneuvering may cause it to break.

Literature seems to have limited evidence on retrieval of broke knife during lumbar disc surgeries, and such cases might be underreported. Furthermore, the situation is complicated by lack of any guidelines in this regard. A retained blade fragment can cause complications like infection,granulomatous foreign body reaction, migration and can pose potential risk to visceral organs. Studies in past suggest that such metallic foreign bodies in the vicinity of spinal cord can lead to late onset myelopathy [4,5].

Amirjamshidi et al in 1993 were the first to describe retained surgical blade in lumbar disc space in a series of four cases[1]. In three out of four cases, the blade was retrieved in a second surgery. One patient was kept on follow-up as his serial radiographs had not shown migration of the blade fragment. Rahimizadeh in 2013, described retrieval of retained blade in L4-L5 disc space via anterior approach using transforaminal corridor, in a second surgery[2]. The same author described another case in 2016 in which a bade fragment retained in L5-S1 disc space was retrieved using transforaminal corridor[3]. All of the removal procedures were done after few days to months after primary surgery. Table 1 gives a detailed description of these reports.

Table 1. A detailed description of previous reports.

Author/year	Cases	Age/Sex	Diagnosis	Location of broken blade	Interval between index surgery and blade retrieval	Approach	Whether the blade fragment was successfully retrieved
Amirjamshidi et al (1993)[1]	4	Case 1 - 45/Male Case 2 - 50/Female Case 3 - 55/Male Case 4 - 61/Male	Case 1- L4-L5 disc protrusion Case 2 - L5-S1 disc protrusion Case 3- L3-L4 disc protrusion Case 4- L4-L5 disc protrusion	Case 1- L4-L5 disc space Case 2 - L5-S1 disc space Case 3 - L3-L4 disc space Case 4 - L4 -L5 disc space	Case 1- more than 2 weeks Case 2- 2 days Case 3- NA Case 4 - 4 months	Case 1 - Transabdominal retroperitoneal Case 2- Posterior approach (same incision) Case 3 - Transabdominal retroperitoneal followed by posterior approach used in primary surgery Case 4 - posterior approach via wide laminectomy and bilateral foraminotomy	Case 1 - Yes Case 2 - Yes Case 3 - Yes Case 4 - No
Rahimizadeh et al (2013) [2]	1	69/Female	L4-L5 disc protrusion	L4-L5 disc space	4 days	Transforaminal approach (Posterior incision)	Yes
Rahimizadeh et al (2016) [3]	1	26/Female	L5-S1 disc protrusion	L5-S1 disc space	3 days	Transforaminal approach (Posterior incision)	Yes
Our Case (2018)	1	65/Female	L3-L4, L4-L5 disc protrusion	L3-L4 disc space	Same Surgical sitting	Anterior transabdominal approach to retroperitoneal	Yes

Delaying the retrieval of knife fragment may lead to several complications as already mentioned and may cause difficulty in localization owing to fibrosis around it[1]. In a case described by Amirjamshidi et al, the blade fragment in L4-L5 disc space could not be retrieved even in second surgery owing new bone formation which prevented access to the blade fragment[1].In one case reported by Rahimizadeh et al, the knife fragment was seen to be significantly displaced within the first 3 days[3]. Thus, we believe that the retained knife fragment should be retrieved in the same surgical sitting. When posterior transforaminal route or widelaminectomy fails to provide adequate visualization of knife fragment, intraoperative imaging and microscope can help in bettervisualization. However, when these two steps fail to help in retrieval of broken blade fragment, anterior approach should be used. Discussing the case with general surgeons can be really helpful as they are more familiar to anterior transabdominal route and handling the viscera.

The anterior transabdominal route provides a potential solution for anteriorly displaced blade fragment during lumbar disc surgery when posterior transforaminal route fails to retrieve it. While entering the disc space with a number 15 blade, one should be careful not to rotate the blade within the disc space and avoid grating against the sclerotic end plate.It is also prudent to examine every instrument for integrity while taking out from operative field. However, in case the blade does break, every attempt should be made to retrieve the fragment in the same sitting as migration of blade can cause catastrophic injury to neural elements or great vessels lying in the retroperitoneum.

Compliance with Ethical Standards

Conflict of interest: None

Financial support: None

Informed consent: Informed consent was obtained from the patient.

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