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CASE REPORT

Direct withdrawal of a knife lodged in the thoracic spinal canal in a patient with normal neurologic examination: is it safe?

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Stab wound injuries to the spinal cord are rare, although they commonly cause complete or incomplete neurological deficits. Normal neurological examination with a knife traversing the spinal canal is extremely rare. Here we report on a patient with a knife lodged in the thoracic spine with normal neurological examination and describe direct withdrawal of the knife with excellent results that have not been reported to date. A 50-year-old male patient was admitted to the emergency service because of his sustaining a stab wound to thoracic 3–4 level due to a knife traversing the spinal canal and still lodged in the vertebral bodies. His neurological examination was normal. The knife was withdrawn in the operating room under general anesthesia without bleeding or cerebrospinal fluid leakage. After withdrawal neurological examination was normal and control magnetic resonance imaging showed no abnormalities. Surgical exploration is suggested for spinal stab wounds if there is a retained body. Some authors recommend exploration even no foreign body is detected. Incomplete or complete cord injuries deserve surgical exploration, but in a patient with normal neurological examination direct withdrawal can be a safe option. Exploration of the wound surgically may have risks associated with enlarging the incision, muscle dissection, enlarging dural tear and bony removal, which may have long-term adverse effects. The operation team must be ready for urgent exploration. Cerebrospinal fluid leakage, excessive bleeding or any neurological deficit after removal must mandate surgical exploration. Long-term close follow-up of the patient has paramount importance for late complications such as infection and pseudomeningocele development.

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INTRODUCTION

Stab wound injuries to the spinal cord are relatively rare outside Africa, when compared to other mechanisms.[1,2] These injuries commonly cause complete/incomplete neurological deficits, although nearly two-third of patients show good functional recovery.[2] Since these lesions are uncommon, their treatment options remain controversial.[1,3] Various surgical explorations are described in the literature. Here we report on a patient with a knife lodged in the thoracic spine traversing the spinal canal with normal neurological examination and describe direct withdrawal of the knife with excellent results that have not been reported to date.

CASE REPORT

A 50-year-old male patient was admitted to emergency service sustaining a stab wound to his back with a knife still in place. He was in prone position and the knife was securely in place. He was conscious and alert. His vital signs were normal. A detailed physical and neurological examination showed no abnormality. Computerized tomography (CT) of the spine revealed the details of the situation. The knife entered from his thoracic region and passed through the inter-laminar space of T3-4 level, traversed the spinal canal from posterior to anterior, and was lodged in the T3 and T4 vertebral body and T3-4 intervertebral disc reaching the anterior parts (Figure 1). Thoracic magnetic resonance imaging (MRI) was avoided due to the risk of mobilization and heating of metal parts. The patient was brought to the operating room. Under general anesthesia the knife was retracted from the wound by paying particular attention to the direction of withdrawal, while the operation team was waiting ready for urgent wound exploration. The cutting edge of the knife was through the rostral region, and it was withdrawn basically by applying gentle caudal pressure. After withdrawal of the knife, it was seen that 9 cm of the blade tip was inside and there was a 2-cm wound that was carefully inspected for bleeding or cerebrospinal fluid (CSF) leakage, both of which did not happen (Figure 2). The wound was closed with primary suturing after irrigation. The patient was awakened from general anesthesia and his first neurological examination was normal in the operating room. He was then transferred to the radiology department and immediate MRI of the thoracic region was performed to check for acute problems such as epidural or intradural bleeding, or accumulation of extradural CSF indicating a possibility of future pseudomeningocele formation. No abnormalities were found except signal changes at the T4 vertebral body, indicating the level of injury (Figure 3). Prophylactic sulbactam amphicillin was ordered and he was observed 3 days in hospital, with normal neurological examination. His last visit to the outpatient clinic was at the sixth month of his trauma, and no neurological or physical abnormalities were detected.

DISCUSSION

Most of the spinal stab wounds are found in the thoracic spine (%54–63), followed by cervical and lumbar regions.[4] In most cases the weapon is withdrawn by the attacker. Rarely, in some patients the weapon or a part of it can still be lodged in place, which needs to be removed. Plain X-rays and CT are crucial in the evaluation of

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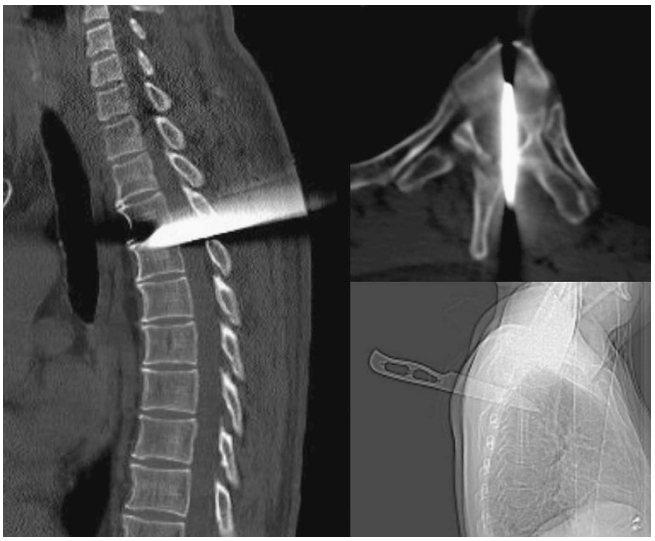

Figure 1. CT of the spine showing 9 cm of the blade tip traversing the spinal canal and reaching the anterior parts of T3 and T4 vertebral bodies.

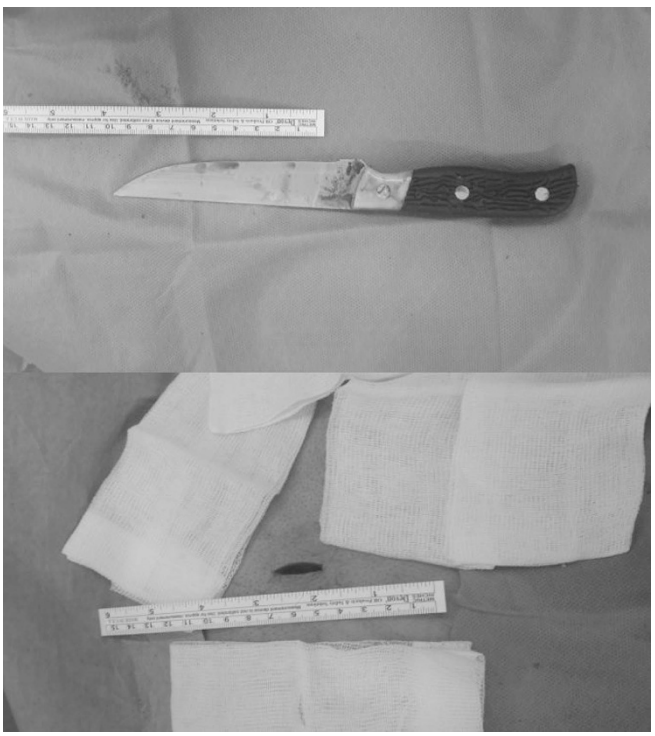

Figure 2. Removed knife and the wound after removal. No bleeding, CSF leakage or pseudemeningocele formation was observed after removal.

patients with spinal stab wounds.[5] MRI was found to provide a superior view of the extent of the injury, including path of the blade, intra-spinal hemorrhage, acute cord edema and contusion.[6,7] However, it is also reported that MRI findings do not have a great influence on the acute decision whether to operate or not.[6] MRI is contraindicated and must be avoided due to the risk of mobilization and heating of the material to prevent secondary damage to spinal cord and surrounding tissues in patients with retained knife blades.[5,8,9] Spinal stab injuries are not common but they are associated with a high percentage of neurological deficits.[1,10] Incomplete injuries predominate

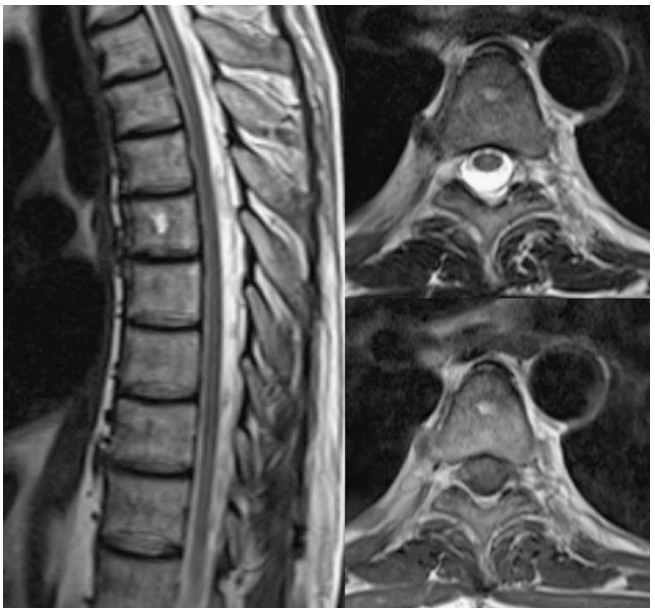

Figure 3. MRI of the thoracic spine after removal of the knife showing normal anatomy of the spinal canal and slight signal changes in the vertebral bodies consistent with edema and hemorrhage.

(Brown – Sequard syndrome), followed by complete injuries.[9] Besides the direct injury caused by the stab to the spinal cord itself, other mechanisms of cord damage are also postulated, including insult to vascular supply of the spinal cord, edema, hemorrhage, ischemia of the spinal cord and countercoup contusion.[11] Avoiding secondary injury after spinal stab wound must be an essential part of management. Methylprednisolone has been shown to reduce cellular damage from secondary injury process and show some beneficial effects after blunt spinal injuries; however, data on spinal stab wounds are lacking to date and not recommended.[5,12,13] Some reports on spinal stab wounds stress the need for surgical exploration. In a review of 450 spinal stab wounds, Peacock *et al*.[1] stated surgical exploration indications such as retained foreign body, persistent CSF leak, radiologic signs of cord compression and infection in delayed stage. The need for removal of foreign bodies lodged in the spinal canal is obvious to prevent infection, myelopathy and delayed neurological deficit.[14] Some authors have recommended surgical exploration of the wound even when no retained foreign body is found on imaging studies.[8,9,11,15] Many of the case reports on spinal stab wound have described surgical exploration for removal of lodged foreign bodies.[8,11,15] But there is no consensus about the technique of removal in the literature. The described approaches are various depending on the location of the foreign body, including exploration to the level of lamina, laminectomy to the effected lamina, laminectomy to the upper and lower lamina, lateral exposures and so on.[11,15,16] Various combinations of spinal stab injuries and clinical pictures are drawn in the literature, but a patient with a lodged knife traversing the spinal canal without neurological deficit such as our patient is a rare entity. The only publication we found is by Li *et al*.,[15] which describes a patient with a lodged knife in the thoracic spine without neurological deficit, which was removed by surgical exploration, and the patient remained neurologically intact after removal.[15] We agree that incomplete or complete injuries deserve surgical exploration of the stab wound especially if there is a retained foreign body, to ensure that the spinal cord is decompressed, and secondary or late injuries are to be avoided as much as possible. But in a patient with a lodged knife without neurological deficit, the indication for

surgical exploration may not be obvious. Most of the weapons are already withdrawn by the attacker in spinal stab injuries. There are no data about the neurological outcomes of the patients in whom the knife is withdrawn by the attacker or removed surgically by clinicians. Exploration of the wound surgically may also have risks associated with enlarging the incision, muscle dissection, enlarging dural tear, and removal of lamina or other bony elements, which may have long-term adverse effects.[8] Finally, the maneuver needed for removal of a lodged knife will still be the same after exploration. It is also reported that dural tears are not always amenable to repair.[11,15]

CONCLUSION

In conclusion, we believe that surgical explorations will add little benefits if any, and have surgical risks in neurologically intact spinal stab-wound patients with a lodged knife. We recommend that withdrawal must be performed in the operating room, as suggested in the literature, while the operation team is ready for urgent exploration of the wound.[5] Brisk bleeding or CSF leakage after withdrawal must favor exploration for these patients. Rapid recovery from general anesthesia is another critical point to perform immediate neurological examination. Any neurologic deficit must mandate surgical exploration. Direct withdrawal of lodged knives in spinal stab injuries can be a safe option in selected patients without neurological deficit. Long-term close follow-up of the patient has paramount importance for late complications such as infection and pseudomeningocele development.[17]

COMPETING INTERESTS

The authors declare no conflict of interest.

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