Penetrating Stab Wounds of the Spine: Two Cases and Review of the Literature

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ABSTRACT
Penetrating wounds of the spine caused by edged weapons are on the increase due to the growing insecurity, violence, availability and accessibility of these weapons, which are generally objects of everyday use (knife, axe, machete, screwdriver, bicycle spoke, scissors, garden fork, sickle and sharpened broom handle, etc.). These objects may be the cause of penetrating wounds responsible for neurological deficits with breaches of the dura mater, or they may be without neurological deficits due to the level of the weapon in the spine. We present two clinical cases of patients with penetrating knife wounds of the spine. One at cervical level with pneumorrhagic emphysema, spinal cord compression and pneumoencephaly, with neurological deficit who had
a surgical intervention followed by physiotherapy and a progressive recovery, the other with a
penetrating wound at L5 crossing the blade to the vertebral body without neurological deficit in
whom the knife was extracted at the emergency department without secondary deficit.
Penetrating wounds of the spine are caused by stab wounds, including knives. In particular,
emphysema, diffuse pneumorrhagia and pneumoencephalus are extremely rare in the same
patient, this being due to the knife extraction technique. These lesions, associated with neurological
deficit and cerebrospinal fluid (CSF) leakage, constitute a neurosurgical emergency.

Keywords: Rachis; stabbing weapon; neurological deficit; pneumorrache; pneumocephly; surgery.

1. INTRODUCTION

Trauma is said to be penetrating when the
penetrating agent penetrates the skin covering to
reach the underlying anatomical structures. The
severity of the injury depends on the underlying
lesions and the risks of haemorrhage and
 septicaemia [1]. This trauma may be caused by a
firearm (FA) or an arm weapon (AB); the FA/AB
ratio varies greatly from one society to another,
depending on the accessibility and ubiquity of
weapons. It is higher in the United States,
England and South Africa, where the number of
gun owners is high, and lower in France and sub-
Saharan Africa [1-4]. In sub-Saharan Africa and
Latin America, edged weapons (machetes,
knives, etc.) are easily accessible and
inexpensive tools that can be used to commit
acts of interpersonal violence [2,5-7]. Some
studies carried out in South Africa show that
edged weapons are more prevalent than
firearms.

A bladed weapon is one whose blade, moved
solely by the human hand, pierces or slices. It is
originally made of bright, shiny metal (as
opposed to bronze), hence its name. Certain
objects can become bladed weapons "through
use" (screwdrivers, etc.). The injuries observed
are related to the size and sharpness of the
penetrating agent, the energy deployed and the
anatomical elements involved [1,8]. The annual
incidence of traumatic injuries to the spinal cord
is 35 patients per million. This is low compared
with the thorax and abdomen, due to the
defensive position assumed by the victim when
attacked [7]. These are generally wounds caused
by surprise or during escape.

2. CASE PRESENTATION

We report here two clinical cases of vertebro-
medullary wounds, including a case of lumbar
wound at L5 reaching the blade and the vertebral
body, without neurological deficit and another
case of cervical wound with neurological deficit
and another
case of cervical wound with neurological deficit,
pneumocephalus and pneumorrache, cervical
and dorsal, by white weapons (knife).

Case 1: Male, aged 27, in the emergency
department for treatment of a stab wound to the
right paramedian lumbar region, the story goes
back 34 hours before his admission, when the
patient received a stab wound to the right lumbar
paravertebral region from his brother, an ex-
convict, after a discussion in which he was
accused by his tormentor of having taken his
money, the sum of 1000fca (1.5 euro /1.3dollar).
The patient was admitted to a primary hospital
and then evacuated to our facility. He is an
anxious, pain-ridden patient with a knife
surrounded by coagulated blood implanted in his
back (Fig. 1); he has no neurological deficits, and
is on anti-tetanus painkillers, anti-anxiety
painkillers and antibiotics based on amoxicillin
and clavulanic acid.

Fig. 1. Showing (A) and (B) a knife implanted in the back
The lumbar CT scan showed lumbarization of S1 with a foreign body in an oblique trajectory crossing the vertebral lamina to implant itself in the body of L5 (Fig. 2).

In view of the patient's indigence, we performed asepsis and then extracted the knife, exceptionally staying in line with the axis of the knife, using local anaesthetic in the emergency department and closing the wound. No neurological or radicular deficits were observed. No leakage of CSF was noted at the 2nd dressing at D4, the patient was discharged to continue care until the removal of care at home (Fig. 3).

The patient was discharged at 3 days post-op to continue dressing at home.

**Case 2:** Young man, 18 years old, seen in emergency for paraparesis following a posterior cervical stab wound.

The story goes back to a day when the patient was the victim of an attack at dusk with a knife in the posterior cervical region; he was received in a first hospital institution where the knife was before being referred to our institution.

On admission, the patient was very anxious and had a posterior cervical wound (Fig. 4), which he said was the entry point for the knife that had been extracted from his neck, leaving a clear liquid, rock water, which was very common in the CSF. He was tetra paretic with 3/5 watch strength in all 4 limbs, with sphincter hypotonia and no bladder globe [9].

A craniocervical CT scan showed subcutaneous cervical emphysema opposite the wound, intraductal pneumorrhoea and pneumocephalus (Fig. 5).

Craniocervical MRI shows cervical spinal cord compression associated with intracanal spinal pneumorrhaphy and diffuse parenchymatous and ventricular malformation.

The indication for surgery was given and the patient was treated by compressive laminectomy and closure of the dural breach.
Fig. 4. Stab wound to the posterior cervical region

Fig. 5. CT scan showing A subcutaneous emphysema, B intracanal spinal pneumorrhaphy, C and D pneumocephalus

Fig. 6. MRI showing: A- B- D-E, spinal cord contusion with intracanal spinal pneumorrhaphy; c, ventricular pneumocephaly; D-E, subcutaneous emphysema
The post-operative period was marked by good healing, with some deficit after-effects treated by supplementary physiotherapy, which enabled the patient to go from standing on a walker to walking with a cane after one month's physiotherapy.

3. DISCUSSION

Morbidity and mortality as a result of violence are on the increase worldwide. It is caused by inactions between men, which can lead to the use of bladed weapons. These weapons can cause wounds and trauma to the spine. In fact, the 1977 report by Peacok and his colleagues on 450 stab wounds to the spinal cord remains the largest of its kind to date (9,10). These injuries accounted for around 25% of all the cases of spinal cord injury they treated over a 13-year period. The authors found that knives were the most commonly used object (84.2% of cases), followed by an axe, machete, screwdriver, bicycle spoke, scissors, garden fork, sickle and sharpened broom handle; stab wounds caused by a pencil and splinter were also reported [10-12].

Our two clinical cases were wounds of the spine caused by the knife, one at cervical level, the other at lumbar level, our sample is very small to draw a comparison on the site of the lesions, having less in the series of Paecok [10] the wounds of the thoracic spine is most affected. The common point is that the wounds are located on the posterior face, in the posterior regions of the trunk, which are areas of wounding by surprise or during escape. In the patient with the cervical wound. Associated lesions include emphysema, pneumorrhachia and pneumoencephalopathy in the parenchymal and ventricular areas, lesions which are very rarely described in vertebral stab wounds [13,14]. The technique used to extract the knife by an untrained team was responsible for this dissemination of the area under the skin and in the neuraxis, and spinal cord lesions were also aggravated by this technique. The patient with the lumbar bullet wounds had no neurological deficits despite the path and depth of the bullet, which could be explained by the nerves of the ponytail which, bathed in CSF, can move and not be traumatized. In both cases, the stability of the three spinal columns did not justify per-surgical instrumentation [15,16].

The management of patients with stab wounds with emphysema, pneumorrhagia and pneumocephalus and spinal cord compression is an emergency; it not only makes it possible to close the dural breach and the subcutaneous air entry pathway to the neuraxis, but also to perform a laminectomy to decompress the cervical cord [14]. This decompression was deficient in order to improve after the laminectomy, supplemented by physiotherapy which remains today the best treatment for neurological deficits of the spinal nerves. In non-deficient patients, the extraction of materials in the emergency department without surgical intervention and openings has been imposed in view of the patient's indigence. The risk of this extraction without surgical intervention is the possibility of creating secondary lesions. In our patient, no deficit was observed after the extraction of the knife. It should be noted that neurosurgical intervention in penetrating knife wounds without neurological deficit remains controversial in the literature [17-20]. The appearance of lesions secondary to the removal of the non-surgical knife is the main point of disapproval [21].

The limitation of this study is related to the number of cases described, given the rarity of cases described in the literature where only clinical cases are retrieved, a multicenter study would be more contribution to deepen the study of stab wounds.

4. CONCLUSION

The rise of the civilisation of violence is increasing with the use of bladed weapons, which are easily accessible at low cost, and their availability, given that they are used in everyday life for many purposes. The forms of bladed weapon are very varied (knife, axe, machete, screwdriver, bicycle spoke, scissors, garden fork, sickle and sharpened broom handle, etc.). The knife is the bladed weapon used in both our patients. These bladed weapons can cause penetrating wounds of the vertebrae and spinal cord, with nerve and infectious complications. While the existence of a meningeal breach and neurological deficit are indications for surgical intervention supplemented by complementary physiotherapy, the place of surgery in penetrating stab wounds without neurological deficit remains controversial.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).
CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


