Case Report

Penetrating Vertebral and Spinal Trauma Complicated by Meningitis in a 2-year-old Child: A Rare Clinical Case

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The selection of a treatment approach for a 2-year-old child with penetrating vertebral and spinal trauma, complicated by meningitis, is presented here. This pathology occurs rather rarely, which complicates the development of a uniform approach for the management of such patients. After surgical treatment of the wound in the lumbar region at L5-S1 level due to trauma, the leakage of a transparent discharge had been observed, the nature of which was unclear; it was considered at this treatment stage to be injury to the right ureter. The secondary surgical treatment of the wound was performed with local flap grafting, external lumbar drainage, and antibacterial therapy. The described treatment approach led to the involution of the main symptoms, and normalization of cerebrospinal fluid indicators resulting in an improvement in the child’s condition. The represented supervision certifies that the penetrating wound does not always require laminotomy.

KEYWORDS: Children, liquorhea, meningitis, penetrating trauma, spinal cord

INTRODUCTION

Penetrating injuries of the spinal cord at an early age are sufficiently rare. Sole cases of penetrating injuries of a child’s spinal cord, with glass fragments, pencils, wooden chips, bicycle spokes, or nails acting as traumatic agents, have been described in the literature. The authors emphasize the objective difficulties in diagnostics and the selection of an efficient treatment approach in the case of childhood injuries.[1,2]

The described injuries of children’s spinal cords are incomplete and became evident in the form of Brown-Sequard syndrome. Such injuries were accompanied by a minimal neurologic impairment in rare cases. Injuries of thoracic and lumbar spine were observed the most often.[3-5]

CASE REPORT

This 2-year-old boy, a rural inhabitant, was delivered to the Neurosurgical Department of the Children’s Municipal Hospital of Omsk, with a suspected penetrating wound of the spinal cord, complicated by meningitis. During admission, the child’s condition was serious, with stunned consciousness, a monotonous, long drawn-out moan, pyretic fever, nuchal rigidity, and meningeal symptoms all observed. Tendon reflexes S = D, and sensitivity disorders were not found. There was a wound after surgery which was about 6 cm long with skin maceration around it and a transparent discharge between stitches in the lumbar region [Figure 1].

It was determined in the case history that 12 days ago, the boy had been accidentally injured by a sharp agricultural tool in the lumbar region on the right side at the L5-S1 level. The wound was stitched up in a rural hospital. On the 2nd day after the operation, a transparent, clear discharge had appeared. The quantity of the discharge had not been determined, but the bandage had been soaking, and it was necessary to change it several times per day. There were no pathologic changes in clinical analyses.

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Injury of the right ureter was suspected. The ultrasonic research and excretory urography were performed. Reliable data in favor of the ureter injury were not obtained.

By that time, the child’s temperature had become elevated, and the leukocyte count in blood had increased.

The lumbotomia with the ureter revision was performed on the right side due to the suspected retroperitoneal infected uro-hematoma. No ureter injuries were found during the revision. The continuation of the discharge from the initial wound in the lumbar region, pyretic fever, and meningeal signs was observed in the early postoperative period.

On the 11th day, a new lumbar puncture was performed: Cerebrospinal fluid was cloudy, under a low pressure, cell count – 1094 in three fields of vision, with 50% neutrophils. During admission to the Neurosurgical Department, magnetic resonance imaging had been performed, and signs of penetrating injury of the spinal cord were found [Figure 2].

There were no data confirming the presence of foreign bodies in the spinal canal. Penetrating spinal cord injury to the lumbosacral region, stab wound of the spinal cord in the left with dura mater damage at L5 level, liquorhea, pneumocephalus. Purulent meningitis. Status after left-sided lumbotomy.

The decision was taken to perform the two-stage surgical treatment. The first stage was revision of the wound, and second was plastic surgery, and application of external lumbar drainage, with the delivery of antibacterial therapy.

If the liquorhea had remained at the second stage, it would have been decided to perform the lumbotomia, laminotomia, and plastic surgery of the pachymeninx defect. The wound canal was directed to the lateral (right lateral) surface of the spine during the revision. An injured place and liquorhea source in the wound were not found. The secondary surgical treatment of the wound was performed with local flap grafting. The external lumbar drainage was installed. Cell count was about 1820 in three fields of vision, mainly segmented, with 3149 g/L protein in cerebrospinal fluid. During the bacteriologic examination of the cerebrospinal fluid, Staphylococcus aureus was found.

During the postoperative period infusions, antibacterial therapy (meropenem 500 mg three times per day intravenously) was performed in the intensive care unit.

On the 2nd day, 450 ml of cloudy cerebrospinal fluid was obtained through drainage. On the 9th day, the quantity of cerebrospinal fluid had decreased to 50 ml, body temperature had returned to normal, meningeal symptoms had regressed, and leukocytosis in the blood and in the cerebrospinal fluid had decreased. The external lumbar drainage was removed on the 12th day. By the time of drainage removal, the cell count in the cerebrospinal fluid was equal to 14 in three fields of vision (14% neutrophils and 86% lymphocytes). The liquorhea from the wound did not resume. On the 22nd day, magnetic resonance imaging was performed, which detected cicatricial adhesion changes in soft tissues of the lumbar region at L5 level [Figure 3]. The child was discharged from the hospital on the 31st day in satisfactory condition.

**DISCUSSION**

The rare occurrence of this pathology, absence of a clear case history, and unclear clinical presentations
complicate the early diagnostics. As the traumatic agents do not always penetrate the spinal canal, the authors remark on the importance of the application of computer-aided tomography and magnetic resonance imaging.[6,7]

Now-a-days, the indications for surgical treatment of injuries of the spine, spinal cord, and coats of children have been reviewed. Skadorwa appeals to surgeons to refuse to perform compulsory laminotomia and revision for children because it could be better to delay the intervention in a number of cases.[8]

Other authors consider the presence of a foreign body in the spinal canal, compression, migration of traumatic agent to the spinal canal, amplification of neurological symptoms connected with bleeding and liquorrea, and unstable injuries of a spine to be unconditional indications for surgical treatment.[1]

Lavelle proposes performing nonoperative treatment with the application of broad-spectrum antibiotics in cases of nonballistic injuries of the thoracic and lumbar spine.[9]

Regarding the time of the operation, the authors’ opinion are the same; it is considered necessary to perform surgery as early as possible before the development of inflammatory complications.

The absence of a neurosurgeon in the rural hospital at the place of residence and delay in seeking neurosurgical care introduced a significant adjustment to the treatment approach in our case.

**CONCLUSION**

The severity of the child’s condition, concurrent purulent meningitis, the operation undertaken, early childhood, and absence of reliable data regarding the size of the pachymeninx defect significantly complicated the efficient selection of the treatment approach. However, the stage-by-stage approach taken by us was effective.

The submitted observation certifies that the penetrating injury does not always need revision if the injury is stable and if there are no foreign bodies. Nevertheless, in the case of such injuries, the treatment approach requires further discussion.

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**Conflicts of interest**

There are no conflicts of interest.

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