Subarachnoid pleural fistula

Subarachnoid pleural fistulas (SPFs) are rare clinical entities that occur after severe thoracic trauma or iatrogenic injury during anterolateral approaches to the spine.

Treatment

Treatment of these fistulas often entails open repair of the dural defect. When direct suturing of the dural defect is not possible, techniques for indirect repair must be considered.

Some of the most difficult aspects of dealing with a CSF leak in this area relates to 1) the relative complexity of suturing the dura directly as it is at a considerable distance from the operating surgeon; 2) the manner in which the contralateral dura slopes away and is hidden from view; and 3) the relatively negative intrathoracic pressure, which encourages the persistent flow of CSF from the intradural to the pleural cavity. Rafa et al. speculate that with open thoracic surgery and the creation of a large potential space with an open dural defect, this technique provided an additional barrier against the formation of a CSF-pleural fistula. Using this technique, they intentionally create a pseudomeningocele into the corpectomy defect that is contained within the confines of our dural-pleural graft [1].

Case series

Between 1993 and 2002, nine patients with SPF observed after spinal surgery at the M. D. Anderson Cancer Center were prospectively followed. In all patients the tumors were located in the thoracic region, and the most common entity was vertebral body metastasis (six cases), with renal cell carcinoma being the most common form of the disease (three cases). All but one patient underwent surgery via a transthoracic approach; in only one patient an intradural approach was performed. The most common presentation was overt cerebrospinal fluid (CSF) leakage, manifesting as chest tube drainage (four cases) or as leakage through the wound (one case). A definitive diagnosis of SPF was established in four patients, with evidence of extraspinal leakage on an 111In-radionuclide CSF study. Although all patients initially underwent a trial of lumbar CSF drainage, all but one required open repair, including creation of intercostal muscle (three cases) and omental (one case) flaps.

After spinal surgery in which the thorax is entered, a diagnosis of SPF should be considered in any patient with abnormal chest tube output, persistent pleural effusion, or clinical evidence of intracranial hypotension. The diagnosis should be confirmed by performing a radionuclide-labeled CSF study. Definitive open repair is required in most cases and preferentially consists of a vascularized tissue graft, which is most easily obtained from an intercostal muscle flap [2].

Case reports

2015

Chu et al. present the case of an SPF in a 2-year-old female after a penetrating injury to the chest. The diagnosis of an SPF was suspected given the high chest tube output and was confirmed with a

positive β2-transferrin test of the chest tube fluid, as well as visualization of dural defects on MRI. The dural defects were successfully repaired with CT-guided percutaneous epidural injection of fibrin glue alone. This case represents the youngest pediatric patient with a traumatic SPF to be treated percutaneously. This technique can be safely used in pediatric patients, offers several advantages over open surgical repair, and could be considered as an alternative first-line therapy for the obliteration of SPFs [3].

1996

Sartal et al. encountered 2 cases of subarachnoid-pleural fistula, both in pediatric patients presenting without any neurologic deficit. Whereas our first patient presented with recurrent, rapidly filling clear pleural effusions with an obscure cause, posing a diagnostic problem for the pediatricians, the second patient had trauma to the pleura and dura mater by the sharp edge of Kirschner wire, with impending risk of injury to spinal cord and infection.

Surgical intervention was undertaken after we had a strong suspicion of subarachnoid-pleural fistula in both cases. A subarachnoid-pleural fistula was found at the level of the eleventh thoracic vertebra in the first patient and at the level of the eighth thoracic vertebra in the second patient. Autogenous tissues (mediastinal pleural flap and hammered intercostal muscle covered with methylcellulose) were used to repair the fistula. The subarachnoid space was decompressed with a lumbar drain in the second patient.

The diagnosis of subarachnoid-pleural fistula is difficult when it is not associated with any neurologic deficit. They found that a high degree of suspicion and early surgical intervention to repair the fistula are rewarding [4].

1991

A seven-year-old girl sustained a gunshot wound to the chest and spine. Evaluation of a persistent pleural effusion demonstrated a subarachnoid-pleural fistula. Surgical closure of the dural defect resulted in resolution of the fistula. Traumatic subarachnoid-pleural fistulae are rare. The diagnosis is reached by an awareness of fistula formation from penetrating or blunt trauma to the chest [5].

1)
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