

Thecal-pleural fistula and tension pneumocephalus: What is the association?

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Clinical Image

A 35-year-old male was transferred to the trauma bay at our institution, after sustaining a gunshot to the posterior neck on the left side. Patient was speaking clearly, awake, alert and oriented to date, place and person. Glasgow coma scale: 15. Physical examination demonstrated tachypnea, accessory muscles respiration, inability to move limbs and decreased sensation to upper and lower extremities bilaterally. Palpable projectile over right axilla was also demonstrated. Computed tomography (CT) of the cervical spine revealed multiple vertebral bodies fractures at the level of C5-C6 and C6-C7 plus diffuse cervical soft tissue emphysema, with air within the spinal canal. Laceration to the pulmonary right upper lobe and fluid density lesion projected into the right oblique fissure which may correspond to Cerebrospinal Fluid (CSF) were also identified, suggesting a thecal-pleural fistula (Figure 1). Associated tension pneumocephalus more evident in the brain frontal lobes was visualized on head CT (Figure 2). Proposed project out trajectory through the left sided neck and the left bony elements to the vertebral bodies and lastly exiting the right sided bony elements was made.

Thecal-Pleural fistula (TPF) is an uncommon complication secondary to injury and disruption to the dural space, vertebral bodies and parietal pleura [1-4]. Common causes of TPF in descending order of frequency include: motor vehicle collision, gunshot where the projectile transverses both the pleural space and the thecal sac associated to vertebral fracture that tears the dura, iatrogenic injury during anterolateral approach to the thoracic spine, stabbing, falls and vertebral disk surgery [1,2,4]. Pathophysiology and patency maintenance of TPF is based on pressure gradients. The intrathoracic pressure ranges from -5 to -7.5 cm H₂O, whereas the intradural pressure is between +10 to +15 cm H₂O, thus air from pleural space moves inside the thecal sac and CSF starts leaking from thecal sac into the pleural space [1]. Presence of CSF in pleural fluid is suspected when there is positivity for B2 transferrin [1,3,4]. Symptoms of TPF involve

nausea, vomiting, postural headaches, altered mental status suggesting intracranial hypotension and dyspnea, recurrent fever or respiratory distress, indicating hydrothorax [1]. Imaging modalities indicated in TPF for the diagnosis of CSF leaks include CT myelography, MRI T2-weighted images and contrast-enhanced cisternography [1]. CT myelogram may reveal extravasation of contrast media into pleural space [4]. In our case, the patient was quadriplegic in supine position, favoring the ascending distribution of air from disrupted cervical thecal sacs into the brain frontal lobes resulting in tension pneumocephalus and Mount Fugi sign [5]. Treatment of TPF include epidural blood patch, dural sealant and continuous noninvasive positive pressure ventilation to decrease the pressure gradient between the thecal sac and pleural space [1,6,7]. In our case, patient underwent sealing of the TPF with muscle patch and duraform glue plus C4-T2 posterior spinal fusion.

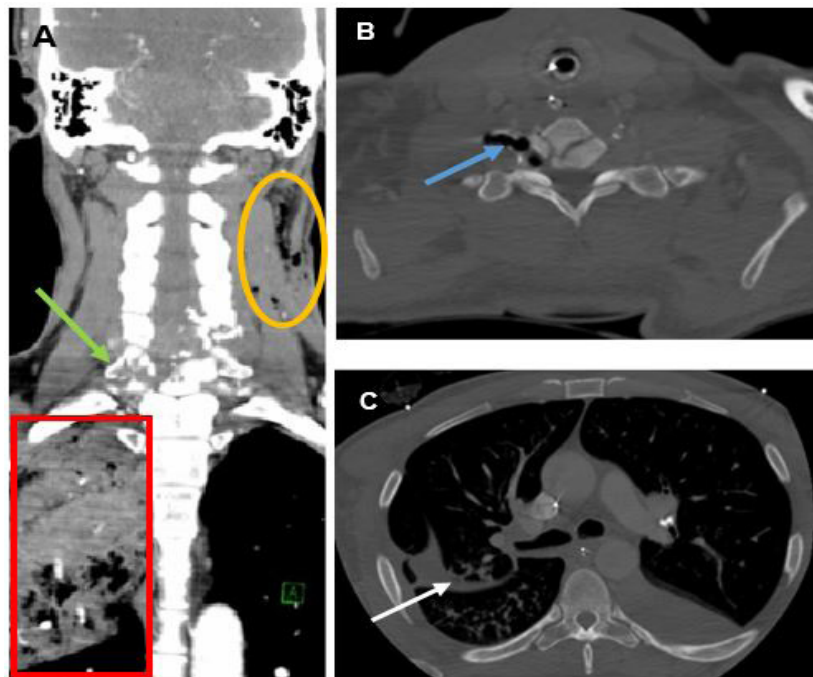


Figure 1: Computed Tomography of the Cervical Spine. (A) coronal plane demonstrates diffuse cervical soft tissue emphysema on the left-sided neck (yellow circle), comminuted fracture of C7 vertebral body extending into the right pedicle and transverse process, with bone shrapnel in adjacent tissue (green arrow) and laceration to the pulmonary right upper lobe (red square). (B) axial plane reveals fracture of C7-vertebral body and air within the spinal canal. (blue arrow). (C) axial plane shows fluid density lesion projected into the right oblique fissure (white arrow) which may represent CSF in the clinical setting of thecal-pleural fistula.

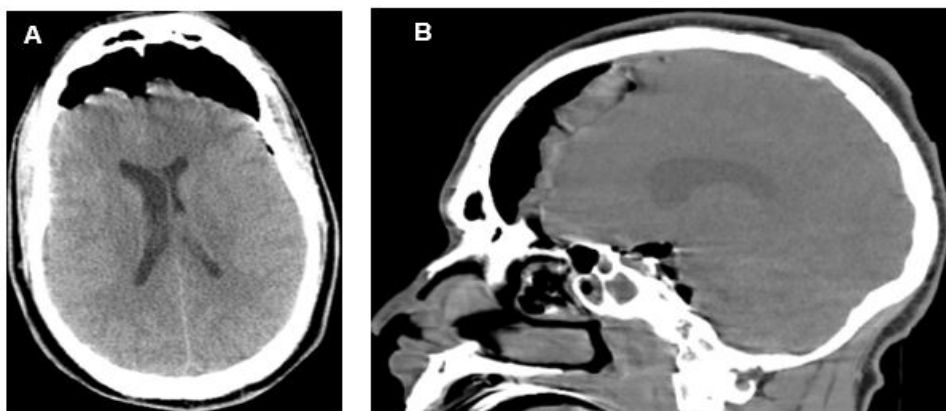


Figure 2: Computed Tomography of the head. (A) axial and (B) sagittal planes reveal tension pneumocephalus in the brain frontal lobes suggesting Mount Fugi sign.

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Manuscript Information: Received: April 10, 2020; Accepted: May 19, 2020; Published: May 29, 2020

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Citation: Gomez JS, Cuellar H. Thecal-pleural fistula and tension pneumocephalus: What is the association?. *Open J Clin Med Case Rep.* 2020; 1667.

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