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A previously undescribed variant of a cervical rib structure related to a split cord malformation and review of the literature

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ABSTRACT

Introduction: Split cord malformation is a congenital condition that varies in form and severity, primarily diagnosed in pediatric patients. Surgical treatment is the most common method of correction. Herein, we discuss an extremely rare case of a split cord malformation associated with a midline cervical rib.
Presentation of case: A 49-year-old male patient presented to the emergency department with cervical spine trauma. MRI and CT scans were performed of the patient, revealing an unknown cervical rib structure and underlying split cord malformation.
Conclusion: To our knowledge, this is the first report of an anomalous midline cervical rib related to a split cord malformation. Such a finding should prompt the clinician to further evaluate such a patient for underlying congenital occult spinal dysraphism such as split cord malformation.

Contents

1. Introduction

Split cord malformation (SCM) is a congenital condition divided into two types, Type 1: where the cord is split to form double dural tubes, and Type 2: where there are two hemicords in a single dural sheath [1,2]. Historically referred to as diastematomyelia, SCM can range from mild to severe, with a majority of patient cases involving pediatric patients [3]. Due to the fact that previous case studies have focused on pediatric patients, we have limited amount of information on this congenital condition in adults. Some congenital abnormalities may cause no significant spinal deformity, and without the need for a chest film or lumbar spine film, the diagnosis will go undetected throughout the patient's lifetime. We herein present an extremely rare case where a 49-year-old patient's split cord malformation was associated with a rib-like structure that then contributed to a bony septum.

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2. Presentation of Case

A 49-year-old male presented with a trauma injury to his cervical spine. The patient had no visible abnormalities on the skin of the back and did not demonstrate any other abnormalities during his initial examination.

A CT scan was performed with the following technique: axial multiple detector computed tomography (MDCT) performed of the cervical spine from skull base through C7-T1 vertebral disc without contrast. The scan revealed spondylitis at the C3-C4, C4-C5, and C5-C6 levels. The patient's imaging revealed a midline congenital anomalous rib structure, with transverse orientation, located in the posterior cervical spine, within the lamina of C5 (Figs. 1–7). The rib structure was measured to be approximately 4.0 cm in length and was located within the posterior soft tissues of the neck.

An incidental note was made of a left renal cyst, and there was a moderate generalized disc bugle at L5-S1. This same level also had posterior vertebral spondylosis and hypertrophic degenerative changes involving facet joints. These changes resulted in moderate to serve right vertebral canal stenosis, with the central and left canals demonstrating minimal stenosis. The rib structure was surgically removed with no further complication or symptoms reported by the patient at most recent follow up.

3. Discussion

The theory behind SCM revolves around an embryogenetic mechanism, where adhesion between ecto- and endoderm causes the formation of an accessory neurenteric canal, which ends up dividing the developing notochord [4–6]. Follow-up studies have shown that the morphological characteristics present on MRI and CT scan images are directly associated with the degree of neurological deficit [7,8].

We present a first of its kind report of a midline rib-like structure associated with a SCM. It has been proven that surgical correction is not necessary for all patients diagnosed with SCM [8]. This case also raises concerns regarding diagnoses of SCM, indicating that neurological deficit should not be the only factor used to consider SCM and imaging should be used more frequently as a common method of diagnosis.

Although not exactly like the present case, we have previously reported a rare occurrence of a midline bony septum that ended posteriorly as a fully formed bony spinous process [9]. We speculated that this anomaly was due to misplaced mesodermal cells associated with the primitive neurenteric tract during approximately the third week of fetal life. This case with a more superficially placed midline septum brings up the point that the clinician who manages such patients may wish to consider this rare morphology and avoid excessive manipulation of such a process, which could potentially injure an underlying split cord malformation.

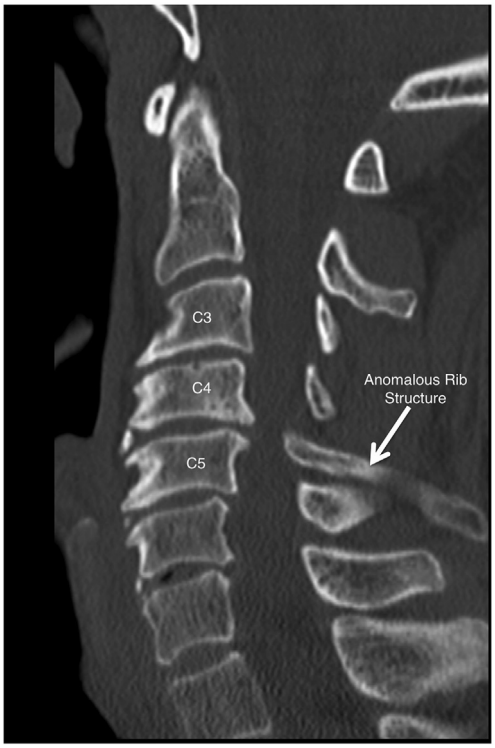

Fig. 1. Sagittal CT noting the anomalous rib entering the spinal canal (arrow).

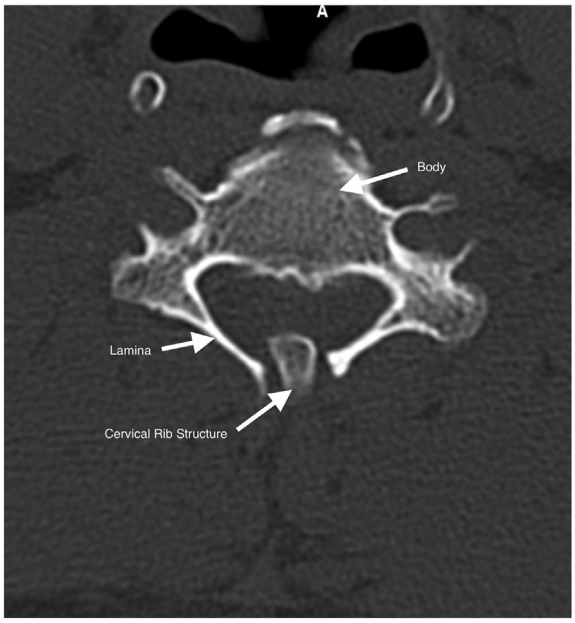

Fig. 2. Axial CT images noting the midline anomalous rib entering the spinal canal.

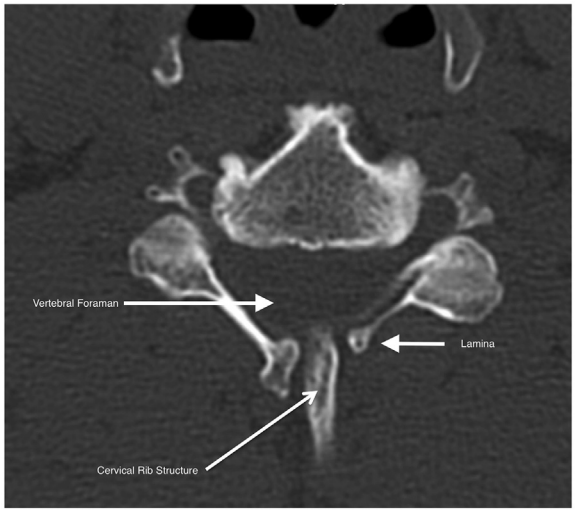

Fig. 3. Axial CT images noting the midline anomalous rib entering the spinal canal.

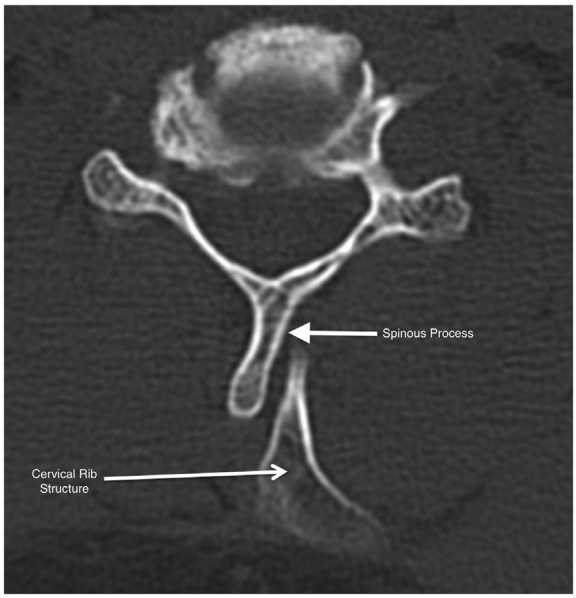

Fig. 4. Axial CT images noting the midline anomalous rib entering the spinal canal.

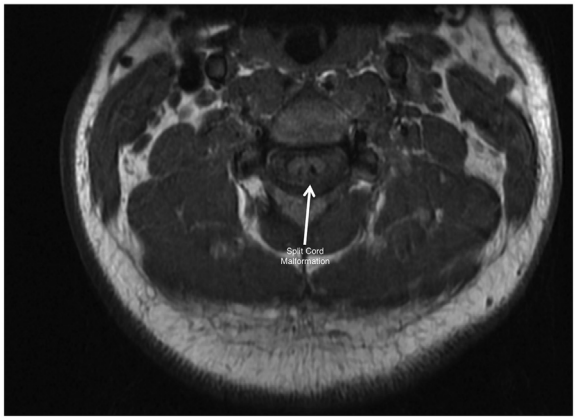

Fig. 5. Axial MRI noting the split cord malformation.

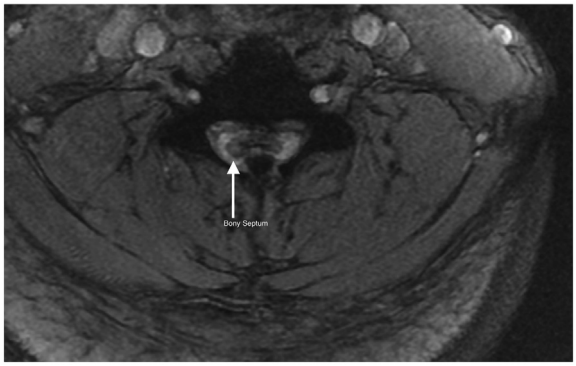

Fig. 6. Relationship of axial MRI noting the split cord malformation to the bony septum.

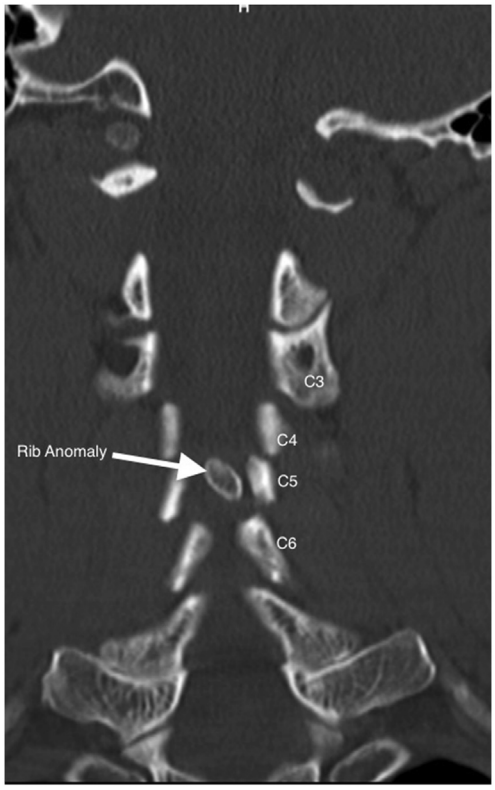

Fig. 7. Coronal CT noting the midline bony rib anomaly and its entrance into the spinal canal.

4. Conclusion

To our knowledge, this is the first report of a rib-like structure being associated with a split cord malformation. Although apparently rare, this finding on routine imaging should be considered to be associated with a potential SCM.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper. No funding was received.

Informed Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent form is available for review by the Editor-in-Chief of this journal on request.

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