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Sonographic Appearance of Congenital Cervical Teratoma: A Case Report

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Case Report

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Abstract

Background: Cervical teratomas account for only 3–9% of neonatal teratomas. Although usually benign, they may cause significant airway compression, necessitating prompt diagnosis and surgical intervention. Cervical teratomas are typically cystic or cystic-solid and often contain calcifications; a predominantly solid, hypervascular mass without calcification is rare and may pose a diagnostic challenge. We report such a case to highlight its atypical sonographic features and the diagnostic value of combining ultrasound with color Doppler imaging and ultrasound-guided fine-needle aspiration (FNA).

Case presentation: A six-hour-old female neonate was transferred for respiratory distress after tracheal intubation. Physical examination revealed a firm midline cervical mass (4×3×5cm). Ultrasonography showed a predominantly solid, heterogeneously echogenic mass with irregular margins and increased vascularity. Contrast-enhanced computed tomography (CT) demonstrated mild enhancement with tracheal displacement, and magnetic resonance imaging (MRI) confirmed tracheal compression. Ultrasound-guided FNA yielded fibrous and cartilaginous elements, supporting the diagnosis of teratoma. The tumor was surgically resected, and histopathology confirmed a mature solid teratoma.

Conclusions: Cervical teratomas may present atypically as predominantly solid, hypervascular masses without detectable calcification. In neonates with respiratory distress and a cervical mass, prompt diagnosis and surgery are imperative. Ultrasonography combined with color Doppler imaging and FNA provides valuable preoperative information for surgical decision-making.

Background

Cervical teratomas are uncommon congenital germ cell neoplasms that are predominantly identified during the early postnatal period. The sacrococcygeal region is the most frequent site of teratoma occurrence, accounting for approximately 70–80% of cases; cervical teratomas, although considerably rarer, account for 3–9% of all neonatal teratomas. Although histologically benign in the majority of cases, these tumors may cause significant airway compression owing to their anatomical location and size, necessitating prompt surgical intervention to avert respiratory compromise. Detailed preoperative imaging studies are instrumental in delineating the extent of the lesion and in assessing its relationship with critical cervical structures.

Case Presentation

We report a case of a neonate with postnatal respiratory distress caused by a congenital cervical teratoma. The diagnosis was established through a synergistic approach involving multiple imaging modalities, including ultrasound, CT, and MRI, and was subsequently confirmed by histopathological examination.

A six-hour-old female neonate was transferred to our facility for the management of respiratory distress after tracheal intubation. She was hemodynamically stable under mechanical ventilation.

On physical examination, a firm midline cervical mass measuring approximately 4 × 3 × 5 cm was identified, with evident skin protrusion (Fig. 1A). Initial laboratory investigations were non-diagnostic.

A comprehensive imaging evaluation was undertaken. Ultrasonography (Mindray M9; linear array transducer L12-4s, 3–12 MHz) depicted a heterogeneously echogenic, solid mass within the cervical region, characterized by irregular margins and patchy hyperechogenicity (Movie 1; Movie 2). Color Doppler assessment revealed increased vascularity within the mass (Fig. 2A–C; Movie 3).

Contrast-enhanced CT demonstrated an irregular soft-tissue mass in the anterior cervical region, measuring 4.3 × 3 × 3.3 cm, with displacement of the trachea and compression of adjacent cervical structures. The mass exhibited mild contrast enhancement, with an attenuation value of 49 HU, increasing to 66 HU in the arterial phase and 78 HU in the venous phase (Fig. 3A–C).

MRI provided corroborative findings, revealing tracheal compression and poor demarcation of the mass from the anterior tracheal wall. The lesion exhibited mixed signal intensities on T1WI and T2WI sequences, with slightly elevated signal on DWI (Fig. 4A–C).

Ultrasound-guided fine-needle aspiration (FNA) of the neck mass was performed using the in-plane technique, yielding a cytological specimen containing fibrous and cartilaginous elements (Fig. 2B–C).

On the basis of the collective imaging and cytological findings, the mass was diagnosed as a teratoma. Given the neonate’s compromised airway, the tumor was surgically resected, and postoperative histopathology confirmed a mature solid teratoma.

Discussion

Teratomas are heterogeneous tumors originating from all three embryonic germ layers. Cervical teratomas are typically located within the anterior and posterior cervical triangles and are distinct from those arising from the skull base or spine[1]. The incidence of cervical teratomas is estimated at 1 in 20,000 to 1 in 40,000 live births. Although most are mature, malignant immature teratomas constitute approximately 5% of cases[2]. Despite their generally benign histology, cervical teratomas carry a significant mortality risk because of the potential for airway compromise[3].

Prenatal ultrasound is instrumental in the detection of cervical teratomas, typically revealing large, heterogeneous anterior neck masses, hyperextension of the fetal head, and compression of the pharynx and upper esophagus[4]. Associated congenital malformations include anal atresia, chondrodysplasia, left ventricular dysplasia with mitral stenosis, and pulmonary dysplasia[5]. Prenatal diagnosis is pivotal for the strategic management of affected pregnancies and for optimizing neonatal care.

The prognosis of cervical teratomas in neonates is closely related to tumor size and malignant potential. Smaller tumors may be asymptomatic, depending on their size and anatomical location, whereas larger tumors can compress vital cervical structures, leading to respiratory distress, dysphagia, and other symptomatic presentations[4, 6].

Preoperative imaging is paramount for delineating the characteristics and extent of the tumor, facilitating surgical planning, and minimizing the risk of injury to adjacent vital structures. Neonatal cervical teratomas are typically described as cystic or cystic-solid lesions, and predominantly solid masses with abundant vascularity are notably uncommon. Ultrasound frequently delineates a cystic-solid mass with an encapsulated appearance and scattered internal calcifications; calcification is present in approximately 50% of cervical teratomas, and a cystic-solid neck mass accompanied by calcifications in a neonate is highly suggestive of a teratoma[7].

In the present case, the diagnosis was definitively established by ultrasound-guided FNA. On retrospective analysis of the preoperative ultrasonography, the mass exhibited a predominantly solid composition, with an intricate pattern of hypoechoic and hyperechoic regions interspersed throughout. The hypoechoic regions may correspond to neural and chondroid tissues, whereas the hyperechoic foci are likely attributable to fibrous components within the lesion. Notably, no distinct echogenic foci indicative of calcification were detected in this case[8]. These observations diverge from the sonographic characteristics typically reported for neonatal cervical teratomas, underscoring the variable nature of these neoplasms and providing a unique opportunity to expand our diagnostic acumen regarding neonatal neck masses.

Compared with CT and MRI, ultrasonography offers significant advantages in terms of convenience and safety. When combined with color Doppler imaging, it provides valuable information on tumor vascularity, and ultrasound-guided FNA can supply the pediatric surgical team with more precise pathological information before surgical intervention, thereby aiding preoperative decision-making.

In neonates presenting with respiratory distress and a cervical mass, prompt diagnostic confirmation and surgical intervention are imperative[9]. The differential diagnosis of a neonatal cervical mass must include cystic hygroma (lymphatic malformation), hemangioma, lipoma, branchial cleft cyst, congenital goiter, bronchogenic cyst, and thyroglossal duct cyst.

Conclusion

Congenital cervical teratomas may present with atypical sonographic features, such as a predominantly solid, hypervascular mass without detectable calcification. In neonates with respiratory distress and a cervical mass, prompt diagnostic confirmation and surgical intervention are imperative. Ultrasonography, particularly when combined with color Doppler imaging and ultrasound-guided FNA, provides valuable preoperative information on tumor composition and vascularity and aids surgical decision-making.

Abbreviations

US
ultrasound
CT
computed tomography

MRI
magnetic resonance imaging
HU
Hounsfiled unit
T1WI
T1-weighted imaging
T2WI
T2 weighted imaging
DWI
diffusion weighted imaging

Declarations

Authors' contributions

WZ and TL carried out image acquisition and drafted the manuscript. TL participated in the design of the study and performed the image analysis. KN and YZ analyzed the patient data and examined the fetuses. All authors resad and approved the final manuscript.

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Availability of data and materials

The data and materials in the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was conducted according to the tenets of the Declaration of Helsinki. Informed consent was obtained from each patient. The study protocol was approved by the Medical Ethics Committee of Gansu Provincial Maternity and Child-care Hospital (Approval number 2023–54). All experiments were performed in accordance with relevant guidelines and regulations.

Consent for publication

The clinical data, photos and imaging used in this case report were obtained with the written informed consent of the neonate's parents, covering the use of these materials for scientific research and publication purposes. All materials will be made freely available in accordance with the relevant Creative Commons license.

Clinical trial number: not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

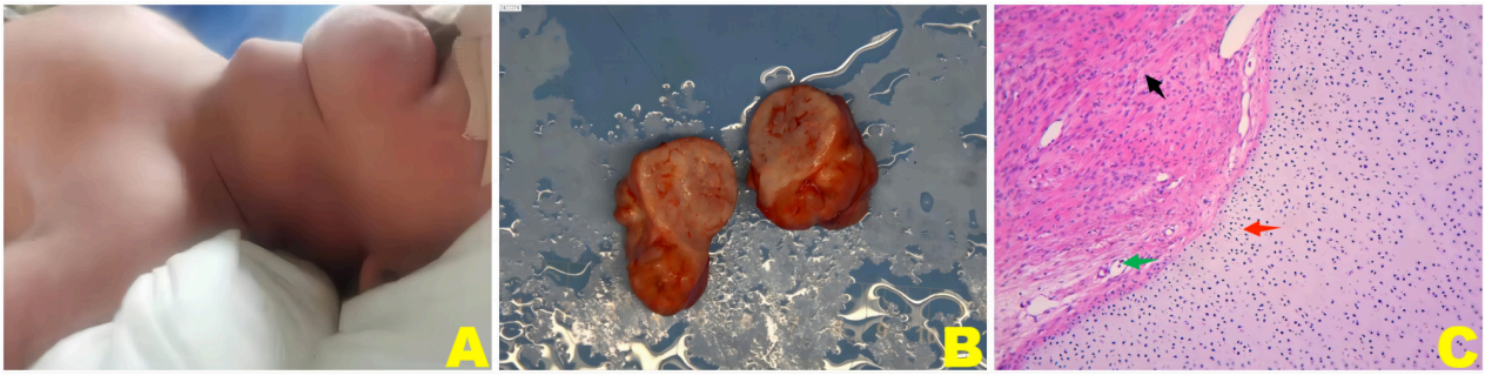


Figure 1

(A) A noticeable mass protruding from the neck of the neonate; (B) the postoperative specimen reveals an irregular, nodular tumor with a translucent cut surface; (C) histopathological findings demonstrate cartilage, fibrous tissue, and neural components within the tumor. Black arrows indicate fibrous tissue; green arrows indicate cartilage; red arrows indicate neural tissue.

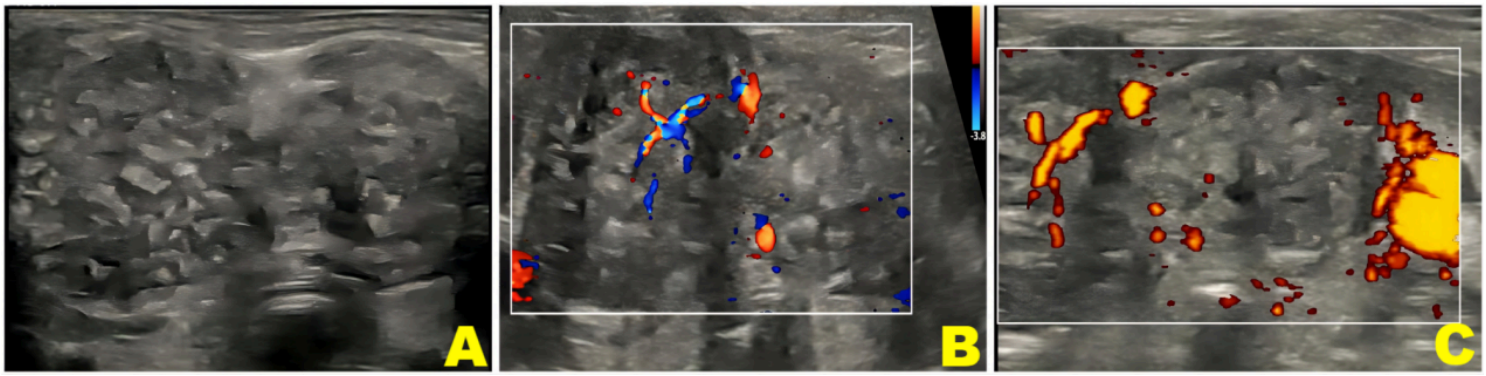


Figure 2

(A) Two-dimensional ultrasonography demonstrates an irregular tumor with patchy hyperechoic areas internally. (B, C) Color Doppler and power Doppler ultrasonography reveal relatively abundant blood flow signals within the tumor.

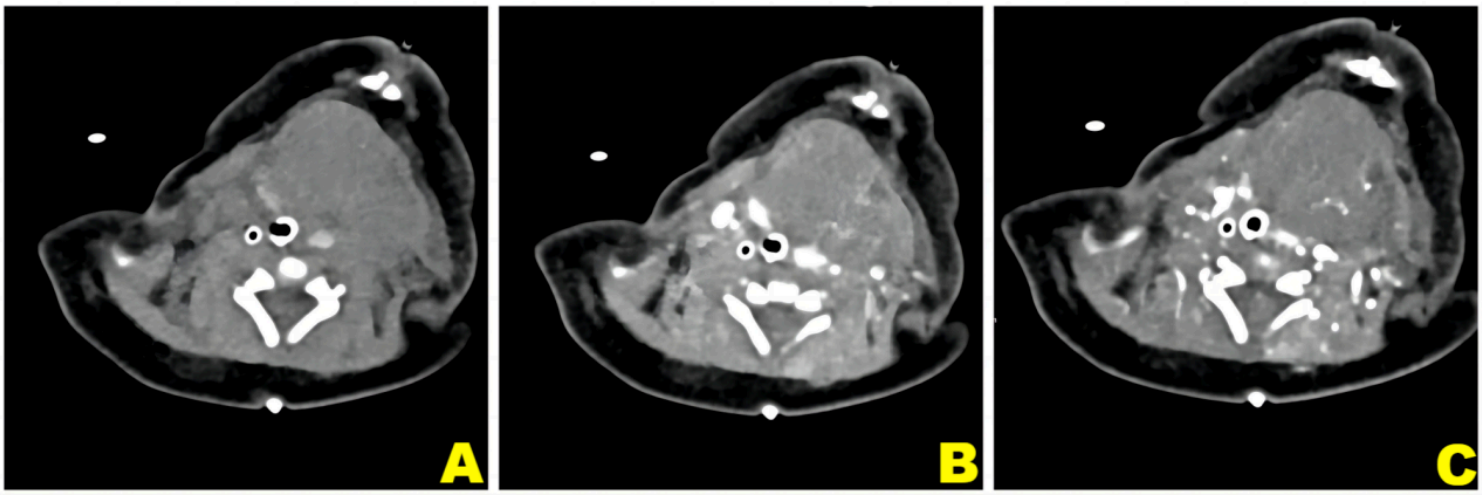


Figure 3

(A) CT scan reveals a solid, irregularly shaped mass in the neck without evident cystic components, compressing the trachea posteriorly. (B, C) Contrast-enhanced CT demonstrates mild enhancement of the mass with visible vascular shadows.

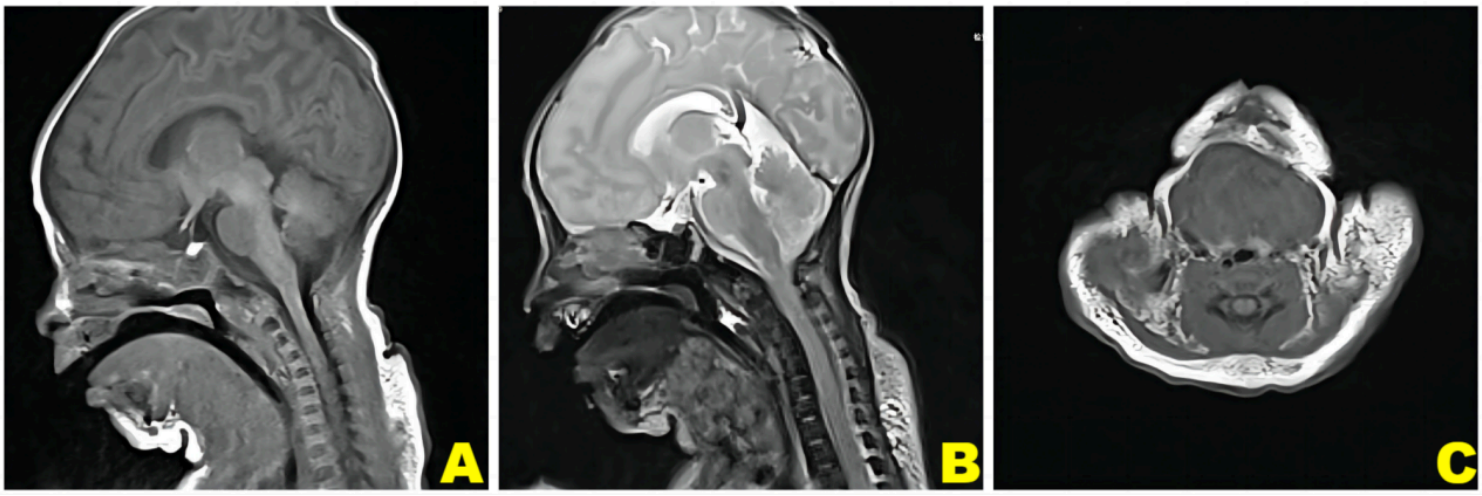


Figure 4

MRI demonstrates the mass compressing the trachea posteriorly, with mixed internal signal intensities. On T1-weighted imaging (T1WI), the mass exhibits isointense to hyperintense signals, whereas on T2-weighted imaging (T2WI) it shows a combination of hyperintense and hypointense signals.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Movie1.mp4
- Movie2.mp4
- Movie3.mp4