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Posterior wall puncture of internal jugular vein and inadvertent carotid artery cannulation

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To the Editor

Arterial cannulation during placement of a central venous catheter can cause significant morbidity. Complications from arterial misplacement include bleeding, hematoma formation, hemothorax, pseudoaneurysm formation, arteriovenous fistula formation and stroke. Arterial puncture with a small "finder" needle is usually benign and occurs in up to 11% of cases of IJV cannulation. On the other hand, arterial misplacement of venous cannulas is a much more morbid complication and is known to occur in 0.1% to 0.8% cases of IJV cannulation. Unintended arterial cannulation can occur with or without the catheter traversing the IJV [1].

The adjacent image displays a 7Fr triple lumen central venous catheter traversing the IJV and inadvertently being placed in the common carotid artery (fig 1). This occurred despite the use of ultrasound, albeit for preprocedural identification of landmarks rather than live guidance. This transvenous placement of the catheter highlights a potential limitation of ultrasound guided placement when only static ultrasound or ultrasound-marked techniques for central venous cannulation are utilized. The inability to visualize the introducer needle tip can result in penetration of the far wall of the IJV going unnoticed and subsequent transvenous catheterization of the adjacent carotid artery. In an observational mannequin study, a more than 50 % incidence of posterior wall penetration of the IJV has been reported when IJV cannulation was attempted by less experienced providers [2]. Real time (dynamic) ultrasonography and needle tip localization during insertion are necessary elements of ultrasound guided central venous catheterization [3]. Variations in the anatomic relationship between the carotid artery and internal jugular vein, and alteration of this relationship by increasing head rotation may go unobserved if only utilizing static ultrasonography. Guidewire identification in the brachiocephalic vein by ultrasonography or in the superior vena cava by means of transesophageal echocardiography are alternative recommended techniques [4]. Unfortunately, this patient received high dose vasoactive medications through the catheter placed in the carotid artery and suffered catastrophic neurological injury.

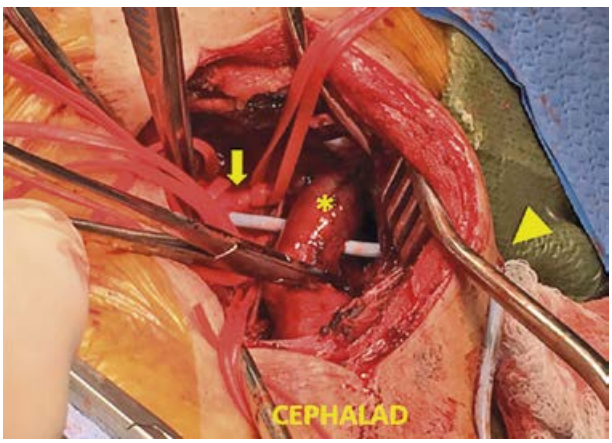

Fig 1. A 7 Fr triple lumen central venous catheter traversing the IJV (asterisk) and inadvertently being placed in the common carotid artery (arrow). Fr= French

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Ultrasonographic diagnosis of occulted costal cartilage junction fracture

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To the Editor,

A 28-year-old man visited our outpatient clinic with complaints of sharp right anterior chest pain, especially when coughing, 3 days after his friend had hit him with his elbow. Physical examination revealed a tender area at the anterior upper chest region with minor swelling and erythema.

Ultrasonography (US) (fig 1a) was performed by placing the transducer on the tender area on the anterior chest wall and revealed a hyperechoic fragment between the rib and cartilage junctions. Figure 1b shows the costal cartilage of the tender area compared to the asymptomatic opposite chest wall. The patient then received conservative treatment for costal cartilage junction fracture, such as rest, ice pack, and anti-inflammatory medication. At 3 weeks post-treatment, the patient reported no further pain.

Rib linear fracture or costal cartilage fracture may present as pain over the chest wall with the symptoms worsening during inhalation, exhalation, or coughing. Generally, radiography indicates a negative interpretation for this type of fracture.

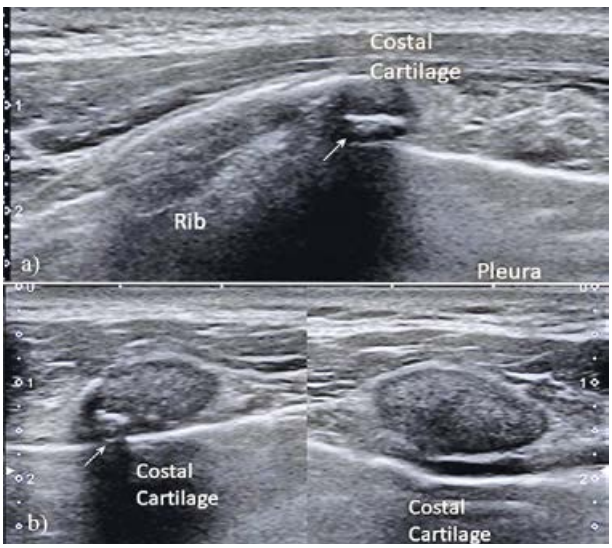

Fig 1. Ultrasonography image was obtained by placing the transducer on the tender point on the anterior chest wall which revealed a hyperechoic fragment (arrow) between the junction of rib and cartilage; b) the costal cartilage of the tender area compared to the asymptomatic opposite chest wall.

US of the chest wall is not widely discussed in the musculoskeletal field. The rib has just an ordinary bone appearance characterized with bright and hyperechoic image. The pleura also presents as a hyperechoic line between the chest wall and lung. Remarkably, the costal cartilage presents a hypoechoic appearance compared to

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its adjacent soft tissues [1]. Moreover, the costal cartilage pattern in children and young adults is more hypoechoic than in older individuals [1].

Low-energy trauma can also cause rib fracture, with radiography being the first-line imaging for rib fracture detection [2]. A previous study demonstrated that US is more sensitive than radiography when detecting rib fracture and is more useful for a costal cartilage fracture due to the invisible cartilage in radiography [3]. Therefore, US is suggested as a suitable first-line imaging with radiography for evaluating the possibility of rib or costal cartilage lesion.

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Ultrasound examination avoids tunnel vision: diagnosing a simple/painful (epi)dermal cyst

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To the Editor,

A 37-year-old woman presented with right cervical pain (at C3 level) - worse during extension or palpation. The pain had suddenly begun three weeks ago, without any specific incident. Plain radiographs had been unremarkable and medical treatment (muscle relaxants) had been ineffective. Her medical history consisted of polycystic ovary syndrome, metabolic syndrome and obesity.

On physical examination, the right posterior neck region was a little swollen and tender to palpation (fig 1a). Neck motions were painful. Comparative ultrasound imaging (fig 1b) using a 6-15 MHz linear probe (Sonosite Edge II, FUJIFILM) showed a round anechoic hypodermal structure (0.3 cm^2) with well-defined borders, also showing acoustic enhancement. An anechoic tract, the punctum, connecting the cyst to the epidermal region was also noted. Sono-palpation was painful and Doppler imaging was noncontributory. With the clinical/ultrasonographic diagnosis of a (epi)dermal cyst, the patient

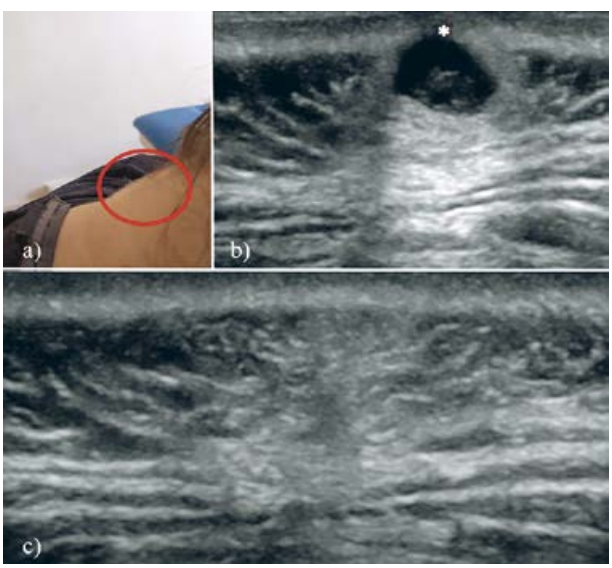

Fig 1. a) Swollen neck region of the patient. b) Ultrasound imaging in short-axis view evidence a right round anechoic hypodermal structure. The punctum (*) that connects the cyst to the epidermal region is also visible. Two weeks later, ultrasound examination confirmed the healing process with normalized subcutaneous tissues (c).

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was called for a control visit. Two weeks later, the cyst had disappeared (fig 1c) and the patient described no pain or difficulty during neck movements.

Herein, we aim to highlight the role of ultrasound examination and sono-palpation in precisely locating the exact cause of pain – in this case a subcutaneous (epi) dermal cyst containing fluid or semi-solid material [1]. These cysts are benign lesions with well-defined round or oval shape, filled with keratin or cholesterol crystals within the keratin component. Conservative management is usually the mainstay of treatment [2]. Of note, during clinical examination, physicians might run into similar painful conditions pertaining to the superficial tissues – rather than the underlying muscles, tendons, nerves, etc. [3]. Likewise, with the aid of ultrasound examination, they might need to promptly recognize simple pathologies of the nearby soft tissues before further referrals or investigations are undertaken [4].

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Dynamic ultrasound imaging and guidance for pectoral nerve block in the management of arterial thoracic outlet syndrome

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To the Editor,

A 61-year-old female (dentist) presented with tightness over her right chest wall, with numbness radiating to the ipsilateral upper limb for the last three months. Magnetic resonance imaging disclosed bulging of the intervertebral disc between the 5th and 6th cervical vertebrae. Despite cervical traction and oral celecoxib for one month, her symptoms persisted. She was referred for an ultrasound (US) examination. No abnormality of the brachial plexus could be identified from the cervical to infra-clavicular levels. We further examined her subclavian vessels which appeared to be patent without external compressive lesions (fig 1A). However, upon deep inspiration, the right subclavian artery collapsed (fig 1B, Video 1) - also eliciting simultaneous ipsilateral upper limb numbness. With the impression of thoracic outlet syndrome (TOS), an US-guided injection was planned. The transducer was placed along the long axis of the subclavian artery. The needle was inserted using the in-plane approach and 4 mL 5% dextrose (mixed with 1% lidocaine) was distributed over the deep fascia of the pectoralis minor muscle (fig 1C, Video 2). The needle was then withdrawn towards the fascia plane between the pectoralis major and pectoralis minor muscles to administer another 4 mL injectate (fig 1D). Two weeks after the injection, she had complete symptom relief and the subclavian artery collapse during breathing was no more seen in the follow-up US evaluation (Video 3).

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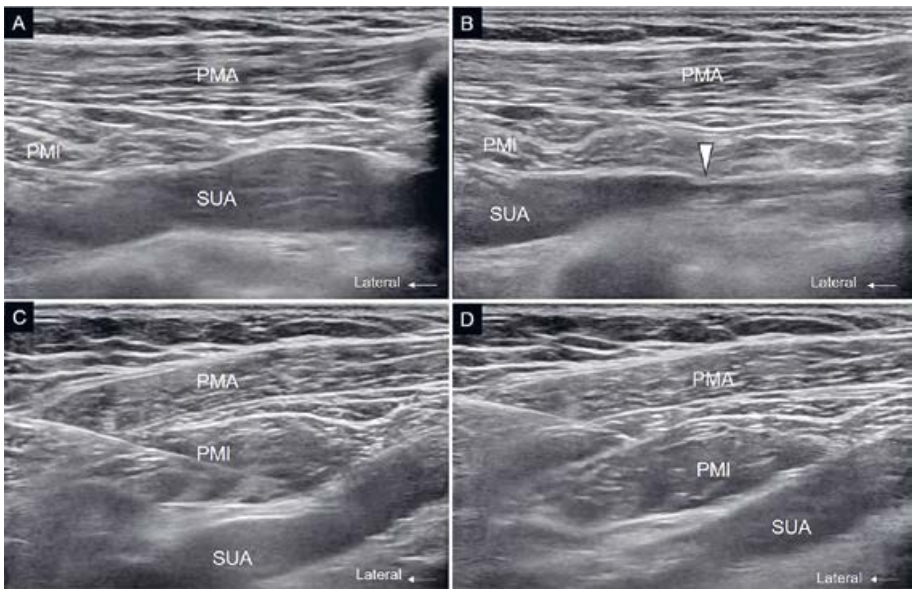

Fig 1. Ultrasound examination of the subclavian artery (SUA) before **(A)** and after **(B)** deep inspiration. Ultrasound-guided injection over the deep fascia of the pectoralis minor (PMI) muscle (C) and between the PMI and pectoralis major (PMA) muscles (D). White arrowhead, collapse of the vessel.

External compression of the neurovascular structures in the cervico-axillary region can causes TOS [1]. In patients with arterial TOS, US imaging facilitates the detection of aneurysms, stenosis, and thrombosis of the subclavian artery. Furthermore, during inspiration, the subclavian artery may be impinged by the bulged pleura and the contracted pectoralis minor muscle (for elevation of the rib cage) - with sudden decrease of the arterial diameter on dynamic US imaging [2]. In our patient, we first injected the deep fascia of the pectoralis minor, where the medial pectoral nerve innervates the muscle [3]. Subsequently, our needle was withdrawn to inject the fascia plane interposed between the pectoralis major and pectoralis minor muscle, where the lateral pectoral nerve was located [3]. In short, this case highlights the usefulness of dynamic US imaging and guided pectoralis nerve block in the diagnosis/management of arterial TOS.

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Clinical and ultrasound findings of hepatic sarcomatoid carcinoma

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To the Editor

A 65-year-old woman was hospitalized due to chills and fever for 6 days, nauseous with no vomiting, and deterioration of her general condition.

Ultrasonography showed normal liver size and shape, smooth capsule, and uniform parenchymal echogenicity. A low echogenicity mass was noted in the hilar part; the boundary remained clear, and the shape was irregular (fig 1a).

Computed tomography (CT) showed a mass-like hyperdense shadow in the medial segment of the left lobe of the liver with irregular shape, unclear boundary, and uneven strengthening after enhancement.

The liver biopsy report was hepatic sarcomatoid carcinoma (fig 1b). Immunohistochemistry findings were as follows: CK+, vimentin+, hep–, CD34–, CK8+, EMA+, S100–, HMB45–, and desmin–.

Hepatic sarcomatoid carcinoma is a rare type of poorly differentiated hepatocellular carcinoma. It is common in patients undergoing chemotherapy or transcatheter arterial chemoembolization. Most patients have abdominal pain or fever and some experience weight loss, jaundice, and ascites.

CT, ultrasound, and magnetic resonance imaging (MRI) are common diagnostic imaging methods. Imaging findings mainly depend on tumor size, growth mode, and the proportion of sarcomatoid components. Small tumors are hypoechoic on ultrasonography, whereas larger tumors can be hyperechoic. MRI showed a large volume, obvious heterogeneity, bleeding, progressive enhancement, pseudocapsule, and lymphadenopathy, which aided diagnosis [1].

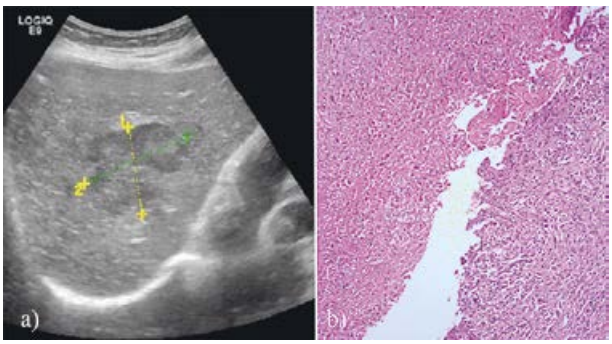

Fig 1. a) Ultrasound showed a hypoechoic with a clear boundary and irregular shape; b) microscopically, the tumor was composed of spindle sarcoma-like cells with a large amount of necrosis (hematoxylin and eosin stain ×50).

In our case, the patient had chills and fever for 6 days. Physical examination revealed mild tenderness in the right upper abdomen without rebound tenderness. There was slight tenderness on percussion of the liver. Blood tests revealed increased leukocyte count, neutrophil percentage, and high-sensitivity C-reactive protein. Clinically, these factors were misdiagnosed as liver abscesses.

Hepatic sarcomatoid carcinoma is a highly malignant tumor with poor prognosis and a low 5-year survival rate [2]. Complete surgical resection is the preferred treatment option. Vascular infiltration, lymph node metastasis, and positive surgical margins are associated with post-resection recurrence.

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Pathology and imaging findings of a lipid-rich breast carcinoma

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To the Editor

A 56-year-old woman was hospitalized for a right breast mass without nipple bleeding. Ultrasonography (US) of the breast revealed an 18×12 mm hypoechoic nodule with unclear boundaries and an uneven internal echo; blood signal was not noted on color Doppler US (fig 1a). Mammography showed heterogeneous bilateral mammary glands with multiple, densely packed "flake-shaped" and flocculent calcifications, with an increased density shadow and unclear boundaries (fig 1b).

The tumor was surgically removed. Histopathological analysis showed infiltrating tumor cells arranged in nests or bands, with large, irregularly shaped, deeply stained nuclei and transparent, vacuolated or foamy cytoplasm; the mitotic figures were clearly visible (fig 1c). Immunohistochemistry results revealed that ER, PR, CerbB-2, P63, GCDFP-15, and calponin were negative; E-cadherin and Ki-67 were positive (with a positive rate of 60%) (fig 1d).

Lipid-rich breast cancer is a highly invasive and rare histological variant of invasive breast cancer [1]. Most patients have painless breast tumors and a few have papillary Paget's disease. The tumors are generally unilateral and mostly distributed in the outer upper quadrant. Some patients may experience nipple overflow or bleeding [2].

In our case, imaging findings of the lipid-rich carcinoma were similar to those of invasive nonspecific breast cancers. Therefore, the possibility of special subtypes should be considered when imaging is performed for invasive breast cancers.

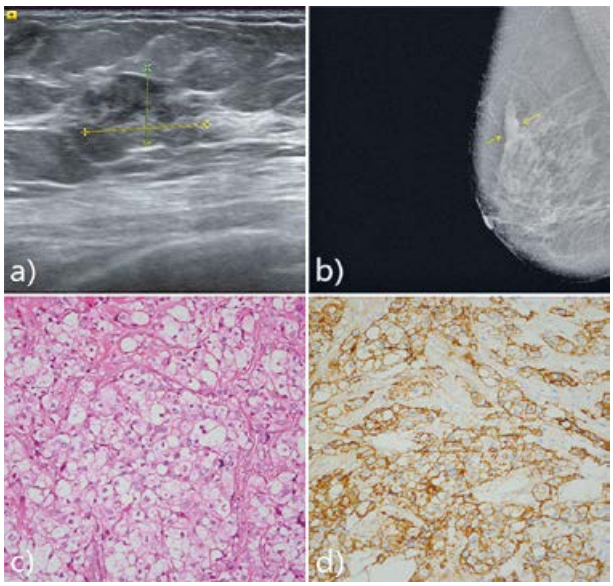

Fig 1. a) breast ultrasound: hypoechoic nodule with unclear boundaries and uneven internal echo (between calipers); b) molybdenum target radiography: increased density shadow and unclear boundaries (arrow); c) histopathology analysis: infiltrating tumor cells arranged in nests or bands; d) immunohistochemistry: positive E-cadherin expression.

Lipid-rich breast cancers are highly malignant, with common recurrence, distant metastasis, and poor prognosis [3]. In our case, lymph node metastasis was absent, and specific chemotherapy was postoperatively administrated. After 40 months of follow-up, tumor recurrence or metastases were not observed.

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A case report of prenatal ultrasound diagnosis of a hiatal hernia in a fetus in the third trimester

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To the Editor,

A 35-year-old woman (gravida 2, para 1) was referred at 34 weeks' gestation for routine prenatal ultrasound examination. The pregnancy had been uneventful, and family histories were unremarkable.

When scanning the thorax of the fetus, in sagittal section, a hypoechoic cystic structure, size of 20/10/18 mm, was determined behind the heart in the posterior mediastinum, and the cystic structure appeared to be in continuity with the small stomach positioned in the abdominal cavity (fig 1a). The heart was normally positioned, without mediastinal shift, and the lungs showed normal echogenicity. None of them seemed to be compressed by other organs. During the ultrasound scanning period, the cystic structure was observed as intermittently herniating into the thorax, sometimes mainly under the diaphragm (fig 1b) and at other times mainly in the thoracic cavity. Hiatal herniation of the stomach into the thoracic cavity was suspected. Further counseling regarding the differential diagnosis and probable postnatal complications took place.

The patient was admitted for spontaneous labor at 39 weeks' gestation. A 3460-g female newborn was delivered vaginally (Apgar scores, 9 and 10 at 1 and 5 minutes, respectively). On the day of birth, the upper gastrointestinal tract series using barium showed part of the stomach was above the diaphragm and herniated through the esophageal hiatus (fig 1c,d), which confirmed the prenatal diagnosis of congenital hiatal hernia (CHH), and there was no finding suggestive of pulmonary abnormalities. During the barium test period, gastroesophageal reflux was observed together with up-and-down movements of the stomach into the neonatal thoracic cavity. The newborn was discharged and treated by domperidon and ranitidine. The baby, still on therapy, is developing well with sporadic episodes of reflux at twelve-month follow-up.

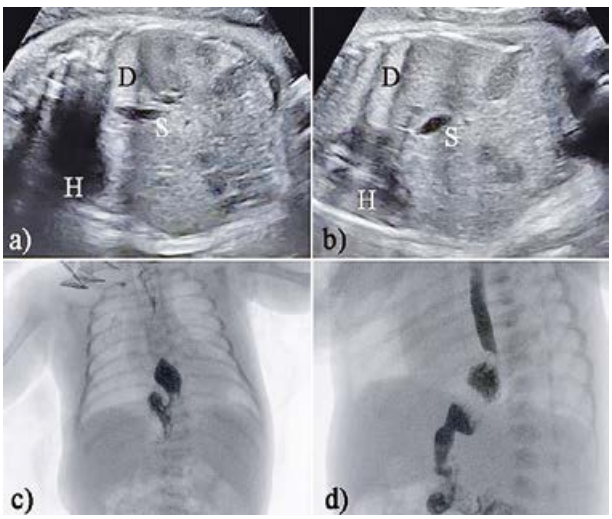

Fig 1. a) Parasagittal view of the fetus revealed that one part of the stomach had slid into the chest and the other part was in the abdominal cavity; b) most of the stomach was in the abdominal cavity; c) and d) the anteroposterior and oblique images of the upper gastrointestinal tract series using barium demonstrating that part of the stomach was above the diaphragm. S, stomach; D, diaphragm; H, heart.

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CHH is rare and mainly postnatally detected; however, it should be considered in the differential diagnosis of any thoracic abnormalities such as diaphragmatic hernia, macrocystic adenomatoid malformation of the lung, esophageal duplication or neurenteric cyst [1,2]. Because an early prenatal diagnosis of CHH for prenatal counseling and postnatal management might avoid unnecessary morbidity and even mortality.

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