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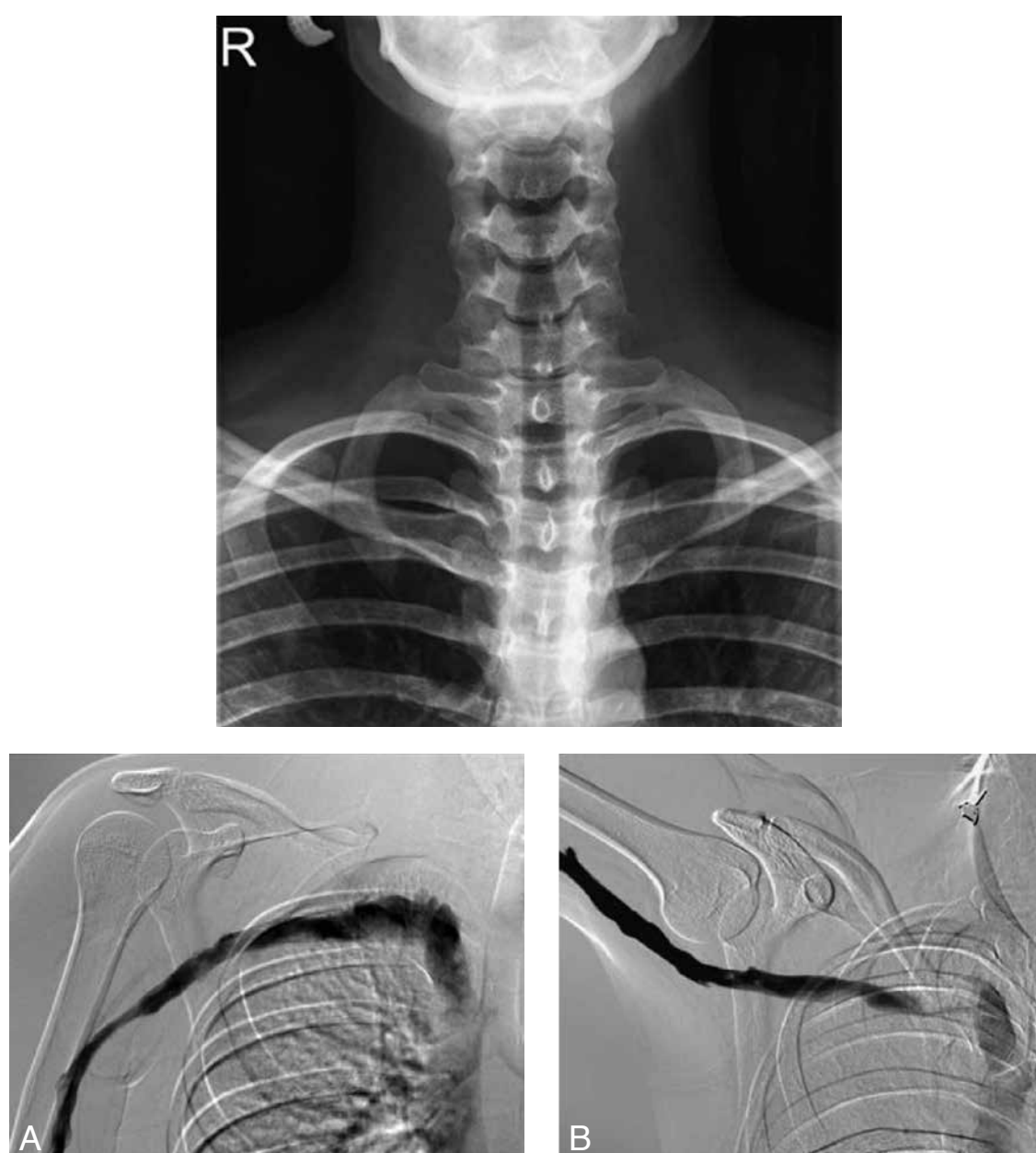
VENOUS THORACIC OUTLET SYNDROME

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Background: A 19-year-old woman, Academy of Sport student, noticed a progressive bluish discoloration, swelling and pain of the right hand and axilla during abduction. The symptoms had been progressive for 6 months. During physical examination there was a normal sensibility and motor function, and normal pulsations of the radial and ulnar artery. There was no significant medical history.

A thorax aperture radiograph was performed, followed by venography of the right arm in neutral position and with abduction.



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Fig.

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2A	2B

Work-up

On thorax aperture (posterior-anterior view) (Fig. 1), no cervical ribs nor bony exostosis is observed.

Venography of the right arm (Fig. 2) shows on right shoulder in neutral position (A) normal findings of the subclavian and axillary vein. On right shoulder in abduction (B) stenosis of the subclavian vein due to compression between the first rib and clavicle is seen.

Radiological diagnosis

Based on the imaging findings the diagnosis of *venous thoracic outlet syndrome* was made.

Discussion

Thoracic outlet syndrome (TOS) can be divided into arterial, venous or neurogenic thoracic outlet syndrome. The neurogenic type is observed in 90-95% of the cases and the venous type accounts for approximately 3-4%. Venous TOS can be caused by a narrowed costoclavicular space, hypertrophic anterior scalene muscle, subclavius muscle or costoclavicular ligament. Other structures which are in close relation to the subclavian vein are the coracocostal ligament, osseous exostoses, cervical ribs and fibrous cords. Cervical ribs are present in 0.5-1% of the general population, but is the cause of symptoms in up to 10% of TOS patients. An important complication of venous TOS is effort-induced thrombosis, called Paget-Schroetter Syndrome (PSS). This is caused by repetitive compression or intimal strain of the axillary or subclavian vein, which occurs during abduction of the arm. This leads to traumatic fissures in the intima of the vein, ultimately resulting in thrombus formation. Pulmonary thromboembolism is a rare complication of PSS, and occurs in 7-20%.

The most common clinical manifestation in venous TOS is upper extremity swelling and pain. Other clinical signs are a feeling of heaviness in the upper limb and venous distention of the upper arm and shoulder region. Symptoms range in severity may be position-dependent, and occasionally the patient may be asymptomatic. PSS occurs primarily in young, otherwise healthy adolescents (mean age 15-30 years), who participate in repetitive upper limb activities (mostly in sports).

Several imaging features can be obtained in the diagnosis of TOS. A plain radiograph should be systematically obtained in order to search for bone abnormalities (like an elongated C7 transverse process and cervical ribs). Arteriography and venography demonstrate the presence of extrinsic compression. Less invasive investigations are duplex ultrasonography, CT angiography and MR imaging. Treatment of TOS varies depending on the cause. The initial treatment of neurogenic TOS is conservative. In arterial TOS, the treatment is focused on revascularization in acute ischemia. Surgical decompression is advised in patients with venous TOS, while the initial treatment in PSS is catheter-directed thrombolytic therapy.

First-rib resection was advised in the presented case because of the risk of PSS.

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