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Cervicobrachial syndrome in conjunction with osteomyelitis in the forearm

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ABSTRACT

Upper limb pain is one of the most common manifestations of pain. The origin can vary widely and can be the result of several aetiologies. In this work, we present a case of a patient with cervicobrachial syndrome who overlapped with another nosology unit. Despite the treatment provided, worsening and unrelenting pain in the right forearm led to hospitalization of the patient. A rare case of osteomyelitis without previous history of accident or surgical intervention was diagnosed as a result of the detection of inflammatory changes and with imaging techniques. Knowledge of the characteristic clinical picture and findings of the physical examination in conjunction with imaging and laboratory examinations can help identify the source of patient difficulties; accurate clinical diagnoses will facilitate the appropriate diagnostic measures and treatment.

Keywords: infection, neuropathic pain, osteomyelitis, upper limb pain

1. INTRODUCTION

Infection, and rarely osteomyelitis, can be a rare cause of upper limb pain. Although bone is normally resistant to bacterial colonization, it can become infected in several ways. The microorganism may enter the bone through the blood or trauma, due to surgery, the presence of foreign bodies, or implantation of prostheses that disrupt bone integrity and the osteocyte lacunar-canicular system, predisposing it to infection (Birt et al., 2017). *Staphylococcus aureus* remains the most common and harmful pathogen (Ricciardi et al., 2018). Prevention and treatment algorithms of skeletal infections and their outcomes have changed only gradually over the last half century (Masters et al., 2022). Early diagnosis and targeted treatment are important as identification of microorganisms is essential for antibiotic treatment (Conterno et al., 2013). Osteomyelitis management requires systemic antibiotic regimes and localised at the site of bone infection, which consists of adequate drainage, extensive necrotic tissue debridement, dead space management, adequate soft tissue coverage, and restoration of blood supply to the bone (Simpson et al., 2001; Rao et al., 2011). The consequences vary depending on the presence foreign bodies, age, the site of infection, and the presence or absence of an adjacent joint infection.

Haematogenous osteomyelitis prevails in the vertebrae, but infection can also occur in the metaphysis of long bones, pelvis and collarbone. Usually occurs on two adjacent vertebrae with a corresponding intervertebral disc (Beronius et al., 2001). Post-traumatic osteomyelitis begins outside the bone cortex and proceeds into the medullary canal. Frequently is found in the fibula but can be observed in any bone. Osteomyelitis often occurs in the feet bones of patients with diabetes mellitus and vascular degeneration. All bones can be exposed to infection, most commonly affecting the lower limbs. Osteomyelitis occurs in acute, subacute or chronic state depending on the duration (Walter et al., 2012). If diagnosis and treatment are delayed, serious complications can occur with a significant impact on the patient's health (Panteli et al., 2017). In 1985, classification system that is now commonly used was developed. In addition to anatomical bone disease and histological features of osteomyelitis, this system also takes into account the immunocompetence of the host (Cierny, 2011). It was subsequently modified for uniformity in host classification and optimal treatment strategy selection (Marais et al., 2015; 2016).

2. CASE REPORT

A 38-year-old patient with vertebrogenic algic syndrome of the cervical and lumbar spine with a spondylo-discogenic aetiology. Patient presented with statokinetic dissociation, bilateral lumboischialgia, radicular irritation L5/S1, and right-sided cervicobrachial syndrome of spondylo-discogenic changes verified by MRI. He had undergone intervertebral disc surgery C5/6 18 months previously. Motor skills improved after pain relief, allowing for regular exercise complained of intermittent exacerbation of neuropathic pain in the right upper limb and lumbar pain. No indication of allergy and without chronic medication. The patient was a smoker with a working history as a carpenter and no travel abroad. After about two month's exacerbation of cervical spine and right upper limb pain due to exercise, the pain escalated but was negated. The most pronounced pain was located in the area of the right forearm, radiating to the III and IV fingers, the thumb was less sensitive. The cervical spine on the right and right shoulder also hurt. The quality of the pain was stabbing and burning, indicating distress, with permanent pain. The pain worsened every day, rated according to the visual analogue scale (0-10/10) at 7-8/10. So far analgesic treatment consisted of: Diclofenac 50 mg twice daily, infusions of saline + mesocain 100 mg + sodium salicylate 1g, a total of 5x, with no effect.

Objective

Neck loose, does not oppose. spinal dynamics disorder, especially during inclination and rotation more to the right, reflexes C5-C8 on upper limbs, lower right, in Mingazzini position without drop, no tactile sensitivity disorder, movement bilaterally correct, pressing force weaker in right, clawed hand position, fingers shoot out only if his wrist is flexed. Afebrile, cardiopulmonary compensated. *Upper limb EMG:* evidence of grade I carpal canal left as well as incipient carpal canal syndrome right. Axonal puncture sensitivity is present. Sensitive ulnar nerve on the left, with demyelination of the ulnar nerve on the left and proximal vs. on vertebrogenic basis. *For analgesic treatment*: recommended diclofenac, tramadol/paracetamol, milgamma injection, infused methylprednisolone 125 mg. Diagnostic conclusion: acute exacerbated cervicobrachial syndrome with radicular irritation C6, C7 on the right with hyperalgesia.

MRI examination of the cervical spine found the following: cervical lordosis straight with block position; C3/C4 discs with signs of osteochondrosis, lined with osteophytic productions; foraminal hernia with stenosis of the right neuroforamen dorsally up to 6 mm with contact to the foraminal course of C4 radix dx.; left neuroforamen narrowed, contact on the foraminal course of the radius C4 sin.; C4/C5 discs with signs of chondrosis, lined with osteophytic productions; asymmetric bulging of the disc accented by bilateral herniation, more to the left, where it extends dorsally to 3.0 mm, contacting the foraminal course of the C5 radix, narrowing of the left with coexistent arthrosis facet C5/C6 discs replaced; the present dorsal osteophyte up to 4.5 mm contacts the lateral recess for the receding C7 radix on the right; neuroforamina narrowed, contact on the foraminal course of C6 bilateral radices, precipitating dextrally; spinal canal stenosis in AP 9.6 mm; C6/C7 discs with osteochondrosis-type degeneration; present asymmetric disk bulging accentuated bilaterally centrally and subarticularly, dorsal up to 3.5 mm with spinal canal stenosis reaching AP size 9.7 mm; narrowing of both neuroforamen; possible position-dependent contact on the foraminal course of C7 radices bilaterally (Figure 1).

Chronic pain clinic check-up after 10 days: Pain is not milder; right hand is about 50% weaker than the left, no sleep due to pain. Had a tremor the night before is responded minimally to analgesia. Swelling and redness of the right forearm for about 2 days leading to restrictions in movement, with the elbow and fingers flexed. The circumference of the right forearm is +2 cm on the contralateral side, and pulsations on the periphery are palpable. Laboratory tests showed a CRP of 178, WBCs $23.57x10^9/1$, fibrinogen 6.39 g/1 other parameter in blood, coagulation screening including D-dimer were within normal limits: creatinine 100.4, albumin 30.95 g/l. USG of the right upper limb did not show thrombosis of the venous system, and the arterial system was without obliteration.

Figure 1 MRI of the cervical spine - discopathy and postoperative changes

The patient was sent for an acute orthopaedic examination and subsequently hospitalized in the orthopaedic department. Antibiotic treatment was started (amoxicillin clavulanic acid 2.4 g every 8 hours, betamethasone 7 mg i.m., mannitol infusion 25 g twice daily for 2 days. Treatment via limb positioning, cooling, and control of inflammatory parameters was recommended in addition to analgesic treatment with NSAIDs. USG examination of the right forearm revealed no focal changes, but slight oedematous leakage. X-ray of the forearm showed concentrated bone structure in the area of the proximal third of the ulna - corticalis could not be differentiated and no lytic changes were evident.

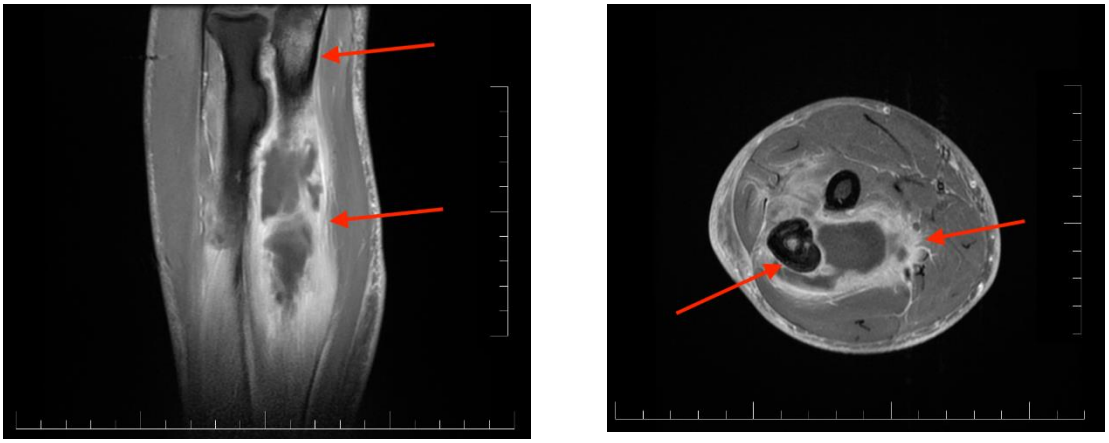

Figure 2 MRI of the forearm with contrast agent, extensive abscess and pathology in the proximal part of the ulna (sagittal and coronary section).

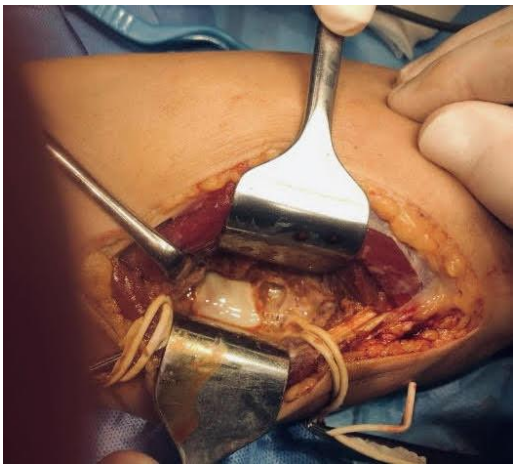

Figure 3 Surgical field - abscess in the forearm.

USG on 3rd day of hospitalization showed the right elbow joint with a discreet effusion, significant synovial filling around the tendons of the flexors and extensors in the proximal third of the forearm, with a limited collection of fluid. Contrast-agent MRI examination of the forearm showed signs of osteomyelitis of the proximal third of the ulnar diaphysis with periosteal prevalence, collection vs. abscess, with mass compartment and neurovascular bundle mass effect, reactive sites, localised subcutaneous oedema (Figure 2). At the same time, a CRP elevation to 223 was recorded, leading to parenteral administration of a combination antibiotic treatment of Gentamicin 240mg at 24 hours and Clindamycin 600mg every 8 hours. Due to the clinical condition and MRI results, surgical revision, abscess evacuation, proximal ulcer trepanation, and abscess cavity drainage were performed (Figure 3).

According to the classification system, the patient was evaluated as host A, anatomical stage III, focus of infection: sequester, damage: severe. Due to a negative history of trauma, haematogenous osteomyelitis was suspected as a possible consequence of micro-injuries in the work process, potentiated by the administration of corticoids for the treatment of pain in cervicobrachial syndrome. Swab cultivation remained sterile. As part of antibiotic treatment of osteomyelitis, Levofloxacin was administered parenterally. This led to a widespread allergic rash throughout the body, so the appropriate antiallergic therapy was applied with a gradual improvement in skin condition.

On the 14th postoperative day, the patient underwent a CT examination of the forearm with a contrast agent. In the area of the proximal third of the ulnar diaphysis, the corticalis is circularly coarsened - up to 7-9 mm with bone eburnation and occlusion with hypodense areas up to 6 mm. In this section, there was also evidence of hypodense areas and with inhomogeneous hypodense channels in the medullar, passing through the cortical radial margin 5.2 mm. These are all signs of osteomyelitis. Periosteally, at the level of the proximal to middle third of the diaphysis in infiltrated muscle structures, multiple calcifications are present vs. residual abscess collections max 68x10 mm. Oedema was present in the subcutis. Revision surgery was suggested to the patient by an orthopaedist, to which the patient did not agree. Complete serological tests were negative. Before being discharged, after 21 days of hospitalization, the laboratory finding showed a decreased CRP to 6.68, leukocytosis persisted at 15.1 thousand, FW 25/53, other laboratory parameters were within the normal range. After discharge from the hospital, the patient took Rifampicin for 6 weeks. In an outpatient department, one month after the operation, he underwent a scintigraphic examination of focuses.

From scintigraphy, the proximal third of the right ulcer diaphysis showed intensely increased osteogenesis with signs of increased perfusion in the first stages of the examination - due to recent surgery in this area, we cannot clearly state whether these are postoperative repair changes or osteomyelitis. Haematological, immuno-allergological, otorhinolaryngological and dental examinations were normal. Two months after the operation, he underwent rehabilitation focused on the right forearm. Control EMG examination showed no neuropathy in the ulnar nerve or in the median nerve. Additionally, no lead block was found. Objectively, the upper limb tone and muscle strength was in the norm, reflexes on the upper limbs were present, symmetrical, squeezing lower on the right. Tactile sensitivity disorder was present in the sense of hypesthesia in the dermatome C7 on the right, with a scar in the proximal part of the ulna at rest. The patient returned to work three months after the operation and underwent spa treatment eight months after.

3. DISCUSSION

The prevalence of patients with upper limb pain of spondylodiscogenic aetiology in the chronic pain clinic is among the highest (Kim et al., 2016). As the clinical case scenario shows, pain in cervicobrachial syndrome can be combined with another nosology unit, and the two images may overlap (Ponnappan et al., 2015; Smith et al., 2015). Despite the extended analgesic treatment, the patient's condition did not improve. On the contrary, the difficulties worsened, which could have been potentiated by the administration of a corticosteroid. Therefore, as part of the differential diagnostic procedure, we supplemented laboratory and EMG examinations as well as imaging techniques. Although osteomyelitis is rare in the absence of surgical intervention, especially in the case of a negative accident history (Uçkay et al., 2006), we managed to ensure a multidisciplinary approach and a properly-managed differential diagnostic procedure to resolve the process in the patient's forearm, thus preventing possible serious consequences to the patient's health condition.

4. CONCLUSION

Diseases of the musculoskeletal system of the upper limbs are one of the main causes of doctor's visits, incapacity for work, disability and health care expenses. Painful syndromes that can mimic cervical radiculopathy include cervicalgia, cervical bursitis, cervical fibromyositis, inflammatory arthritis, cervical spinal cord, root, plexus and nerve disorders, tumours and infections. MRI of the cervical spine should be performed in all patients with suspected cervical radiculopathy. As in this case, a differential diagnosis requires a multidisciplinary approach with the need to perform additional screening laboratory tests consisting of complete blood

counts, erythrocyte sedimentation, CRP, blood biochemistry and imaging techniques to help rule out other causes of pain and serve proper diagnosis.

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Author contributions

OD and PK conceived the study. Data collection and measurements were performed by OD, TM, KL and PK. The manuscript was written by OD and JV. All authors read and approved the final manuscript.

Informed Consent

Written and oral informed consent was obtained from the patient.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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