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Answer: Neurogenic heterotopic ossification.

Heterotopic Ossification (HO) is abnormal formation of bone in non-skeletal tissues. HO can result from trauma (fractures and dislocations), surgery, burns, soft tissue trauma and neurologic injury (brain and spinal cord; referred to as NHO).¹

Approximately 11% of patients with traumatic brain injury and 20% of patients with spinal cord injury develop clinically significant NHO. It usually develops within two months of the neurologic insult (early stage of immature bone formation) with maximum increase over the next six months (intermediate stage with signs of inflammation) followed by signs of bone formation with well delineated cortex (mature stage).¹

Hip is the most common site of involvement with knee, elbow and shoulder being the other joints involved. The wrist, ankle and joints of hands and feet are almost never involved.^{1,2}

Although the aetiology of NHO is not clear, various factors like genetic predisposition, trauma, humoral growth factors, neuro-immunological factors and free radicals may be involved. Additional risk factors include male sex, young age, completeness of the spinal cord lesion and spastic limbs.^{1,2} Cervi-

cal and thoracic cord injuries are seen to produce NHO more often than lumbar lesions.¹

In the early and intermediate stage of formation characterised by swelling, warmth and pain, it can mimic infective conditions. Once formed, it can present with pain, palpable mass, restriction of movements and symptoms of nerve entrapment. The hip joint involvement can affect sitting balance, transfers, gait and perineal care.^{1,2}

Isotope bone scan is helpful in early detection, while conventional radiography is the imaging modality of choice in later stages (after 2-6 weeks). It reveals formation of bone cortex and trabeculae across the joint (Panel) with relative sparing of the joint space. Computed tomography scan helps in visualisation of the mass in 3-dimension for surgical planning.¹

NHO is not known to regress spontaneously and preventive treatment is directed at limiting the progression of NHO.¹ Non-steroidal anti-inflammatory medications, radiation therapy and bisphosphonates have been used in the prevention of NHO. Surgery may be indicated after the lesion has matured (usually one year) to improve joint mobility and facilitate perineal care. The recurrence rate of clinically significant NHO after surgery is high, between 17% and 58%.^{1,2}

REFERENCES

- 1: Cipriano CA, Pill SG, Keenan MA. Heterotopic Ossification following traumatic brain injury and spinal cord injury. *J Am Acad Orthop Surg* 2009; 17:689-97.
 - 2: van Kuijk AA, Geurts ACH, van Kuppervelt HJM: Neurogenic heterotopic ossification in spinal cord injury. *Spinal Cord* 2002; 40:313-26.
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