“la synoviorthèse” can more than synovitis!

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The report by Sabet et al. [1] in this issue of EJNM does not conform to the standard mechanism of action of radiosynoviorthesis (RSO) and highlights the possible capability of this modality to treat distinct arthropathies.

Indeed, RSO has been used for decades to treat patients with hemarthropathy (HA) and rheumatoid arthritis (RA). Yet, there are only a few controlled studies with clear-cut evidence regarding the clinical results using different radiopharmaceuticals and the effects of internal irradiation with respect to different pathophysiologies and stages of disease in HA and RA. In addition, discrepancies with regard to diagnostic work up and radiopharmaceuticals used in different countries make a comparison of published data on this topic difficult [2].

Radiosynoviorthesis (RSO) is a local selective treatment with intra-articular application of a proper unsealed beta-emitting radioisotope to irradiate a pathological synovial membrane that may be causing fibrosis and reducing joint effusion [2]. Today, the radiopharmaceuticals used for this purpose in Europe are mainly Y-90-Citrate (for the knee), Rhenium-186-Sulfide (for shoulder, ankles), Erbium-169-Citrate (for interphalangeal joints), and P-32-colloid (also for knee joints in many countries). The major indications are hemarthropathy in hemophilia and synovitis in RA [3].

A bone scan with blood pool imaging (BPI) is considered a predictor of response to RSO in RA and osteoarthritis [4], whereas no data are available on response of HA to RSO

treatment. Increased blood pooling and intensity of the blood pool are associated with patient response to RSO [5]. However, the prerequisite of RSO response is also a homogenous intra-articular distribution and retention of the radiopharmaceutical to achieve the highest irradiation to the synovial tissue by direct irradiation or by a cross fire radiation effect [6].

Pathogenesis of RA is determined by inflammation and is characterised by erosive symmetric synovitis [7]. Thus, the major factor affecting the response would be the highest activity and capacity of macrophages to phagocytize and internalize the radiopharmaceutical around the superficial intima surface, and particularly in the deep layers of hypertrophied inflamed synovial membrane as shown by autoradiography [8]. Accordingly, appropriately used small size (2–5 microns) colloid particles are reported to achieve good outcomes of RSO in RA [4, 9].

In contrast, Hemophilia A is a bleeding disorder caused by a deficiency of clotting factor VIII. About 50 % of patients have severe hemophilia A with severe bleeding; without appropriate treatment, the condition leads to irreversible HA [10–14]. Joint bleeding results in iron-mediated synovitis and irreversible hemarthropathy. Experimental joint bleedings, when combined with loading of the affected joint, resulted in features of progressive degenerative joint damage [12, 14]. In cases of prominently degenerated inactive disease and lack of hyperphagocytosis, the major impact factor in optimizing irradiation of the superficial layers of intima to induce fibrosis is the larger size of colloid particles, whose purpose is to extend intra-articular retention and avoid leakage from the joint.

It can be postulated that smaller colloidal particle sizes are favorable in cases of active disease with hyperphagocytosis such as RA, whereas larger vehicles are more appropriate in cases of inactive joint disease such as HA.

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In light of this hypothesis, the effect of RSO in patients with inactive arthropathy, such as osteoarthritis, with recurrent effusion and recurrent effusion after endoprosthetics, should be reevaluated.

Since the leakage of the radionuclide along the needle track may result in radiation burns with later scarring [3, 4], irrespective of different radiopharmaceuticals and techniques used, immobilisation of the treated joint after RSO is mandatory.

Despite modern modalities for diagnosing arthropathy, bone scan remains the only imaging technique with which to assess the bone metabolism through the whole body, offering overall available modality with a high sensitivity at an affordable cost. Using bone scan in a 3-phase mode of perfusion, blood pool and mineralisation phases enables the clinician to detect inflammation with a high sensitivity, and to discriminate it from localisation and extent of the degenerative joint compartment [15].

Open and arthroscopic surgical synovectomy, and radionuclide synovectomy are the options in patients with HA and RA with hypertrophic and exudative joint disease who fail to response to systemic therapy and local corticosteroides. Outcomes are reported to be similar for all three procedures, decreasing the frequency of effusion and joint bleeding by 70–100 % [16, 17], and pain relieve and reduction in synovitis in 60–80 % of RA [2]. However, with respect to cost-effectiveness and minimal invasiveness [18], RSO is the treatment of choice, especially in low income countries, and should be the therapy of choice in multimorbid patients with high risk for operation.

This timely study highlights the need for further controlled studies to elucidate the proper indication of RSO with proper preparations in arthropathy. Understanding the radiobiological features specific to RSO can improve our ability to administer this therapy and encourage clinicians to consider RSO in symptomatic patients with distinct arthropathies.

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