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Radionuclide therapy of inflammatory joint diseases

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Introduction

After failure of intra-articular steroid treatment in arthritic patients radiosynoviorthesis leads to restauration of synovium in a single treated joint with improvement of joint function by reduction of pain, swelling and stiffness.

Methodology

The main indications for radiosynoviorthesis are:

- Rheumatoid arthritis
- Seronegative spondarthropathy (Psoriatic arthritis, Bechterew's disease)
- Recurrent joint effusions
- Pigmental villonodular synovitis
- Haemarthrosis in the haemophiliac
- Chronic pyrophosphate arthropathy
- Osteoarthritis (Activated arthropathy) i.e. Finger polyarthrosis, rhizarthrosis, gonarthrosis posttraumatic arthrosis
- After total knee replacement: persistent effusions, polyethylene disease (4)

Absolute contraindications (as usual in all cases of radionuclide application):

- pregnancy
- continuing breast feeding

Relative contraindications:

- in children and juvenile in well-founded exception.

Radiopharmaceuticals

The radiopharmaceutical agent used for radiosynoviorthesis of knee joint is [^{90}Y] yttrium-silicate/-citrate ([^{90}Y] colloid), for medium-sized joints: [^{186}Re] rhenium sulphide colloid; for small-sized joints: [^{169}Er]erbium sulphide colloid. A particle size of about > 5-10 nm is essential to avoid leakage.

The physical chararcteristics of these radionuclides licensed in Europe are shown in table 1.

nuclide	[^{90}Y] (ß)	[^{186}Re] (ß,_)	[^{169}Er] (ß)
phys. half life (days)	2.7	3.7	9.5
range in soft tissue (mm)			
mean	3.6	1.2	0.3
maximum	11.0	3.7	1.0
range in cartilage (mm)			
mean	2.8	1.0	0.2
maximum	8.5	3.1	0.7

Table 1.

For radiosynoviorthesis of the knee joint recommended activity per joint is 185-222 MBq (5-6 mCi). The administered activity of [^{186}Re]-sulphide colloid varies with the size of the joint to be treated, according to table 2.:

Joint	Adm. activity [MBq]
hip	185
shoulder	74-150
elbow	74
wrist	55,5-74
ankle	74

Table 2.

Treating more than one joint, the cumulative activity of [^{186}Re] should not exceed 370MBq (10 mCi) per session. The administered activity of [^{169}Er]-citrate varies with the size of the joint to be treated and the injected volume should not exceed 0.3ml per joint, according to table 3:

Joint	Adm. activity [MBq]
meta-carpophalangeal	22
meta-tarsophalangeal	22-30
proximal interphalangeal	18,5
Distal interphalangeal	15

Table 3. (1)

After tracer administration the needle should be flushed with 0.9% NaCl before being withdrawn. Immobilisation of treated joints i.e. by splint for 48 hours is recommended. Immobilization of the treated joint/s may avoid transport of particles through the lymphatics to the regional lymphnodes.

Side effects

In rare cases fever and allergic reactions have been observed. Radiation necrosis in the injection canal or the adjacent soft tissue is rare if the proper precautions are taken. Dermal necrosis has been reported when high energy yttrium was injected into finger or ankle joints. (5)

Discussion

Response rate reported in the literature ranges from about <60 to >80% (3, 6). In patients with severe destructive joint lesions due to degenerative or inflammatory joint disease radiosynoviorthesis is of limited efficacy. Kerschbaumer et al. (1998) observed, evaluating synovial swelling, effusion, mobility, and pain in a prospective study in patients with rheumatoid arthritis, better results by combining arthroscopic synovectomy and radiosynoviorthesis than using only one of these therapeutic procedures (2).

1. EANM Procedure Guidelines for Radiosynovectomy. Eur J Nucl Med (2003) 30: BP 12- BP 16.
2. Kerschbaumer F, Kandziora F, Herresthal J, Hertel A, Hör G (1998) Synovectomie und synoviorthese als Kombinationstherapie bei rheumatoider Arthritis. Orthopäde 27:188-196
3. Mödder G (2001) Radiosynoviorthesis. Involvement of Nuclear medicine in rheumatology and orthopaedics. Warlich, Meckenheim
4. Mödder G, Mödder-Reese R (2001) Radiosynoviorthese nach Knieendoprothesen: Effektive Therapie bei „Polyethylene disease" Der Nuklearmediziner 2, 24 97-103
5. Peters W, Lee P (1994) Radiation necrosis overlying the ankle joint after injection with yttrium-90. Annals of plastic surgery 32:542-543
6. Savaser AN, Hoffmann K-T, Sörensen H, Banzer DH (1999) Die Radiosynoviorthese im Behandlungsplan chronisch-entzündlicher Gelenkerkrankungen. Z Rheumatol 58: 71-78