

Long term follow up of radiosynovectomy with yttrium-90 silicate in haemophilic haemarthrosis

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Abstract

Objectives—The aim of this study was to evaluate the long term effect of radiation synovectomy with yttrium-90 silicate in haemophilic patients with recurrent haemarthrosis.

Methods—The bleeding frequency and the mobility of the joint were recorded in 16 joints of 14 patients 1 year before radiosynovectomy and during follow up, which ranged from 3 to 6 years. Patients evaluated the effect of their own treatment by completing a questionnaire. Radiographs of the joints were scored by an independent radiologist before treatment.

Results—A satisfactory reduction of the frequency of haemorrhage was achieved in 94% of joints during the first year after treatment and was maintained in 63% until the end of the follow up period. In general there was no decrease in mobility attributable to radiosynovectomy, and the patients' own evaluations agreed with the evaluations based on the frequencies of haemarthrosis in 75%. Patients who had only minor, or no, radiological abnormalities of the joints before treatment showed the best results. One patient developed synovitis as a complication of the radiosynovectomy.

Conclusion—Radiosynovectomy is an effective and safe treatment for recurrent haemarthrosis in haemophilic patients, especially in those who have joints with no or minor radiological damage.

(*Ann Rheum Dis* 1993; 52: 548-550)

Recurrent haemarthrosis causes joint damage that seriously impairs the quality of life of haemophilic patients. Joints are vulnerable as a result of low levels of thromboplastin in synovial tissue and a lack of circulating clotting factor.¹ Consequently, bleeding may occur spontaneously and after a minor trauma. Blood irritates the joint and causes a synovitis that enhances recurrent bleeding, finally leading to synovial fibrosis, haemosiderosis, and rigidity of the synovial membrane and joint capsule.^{2,3} Reducing the frequency of haemorrhage appears to be the only possibility to postpone the development and progress of haemophilic arthropathy.^{1,4} Recurrent bleeding in a single joint requires local treatment to diminish the amount of blood products. Radiosynovectomy is used to manage chronic synovitis,⁵⁻⁷ and is

successful because it causes initial inflammation and necrosis of the synovial membrane, followed by fibrosis. In haemophilic patients this renders the synovia less vulnerable and interrupts the vicious circle of haemarthrosis and synovitis. The technique therefore offers an alternative to conservative treatment and surgical synovectomy. We present the results of a retrospective evaluation of radiosynovectomy with yttrium-90 silicate in patients with haemophilia, who had recurrent bleeding in the same joint.

Patients and methods

From 1980 to 1990 radiosynovectomy with yttrium-90 silicate (⁹⁰Y) was performed in 21 joints in 19 patients who had had at least three bleedings per annum in a single joint and who had given informed consent. The follow up period ranged from 3 to 6 years, except when prophylaxis with clotting factor concentrate was started. Before treatment and during years thereafter, haemarthrosis and joint mobility were recorded. Radiographs obtained before treatment were scored according to Pettersson⁸ by an independent radiologist. Patients completed a questionnaire at the end of follow up in which they were asked about the effect of radiosynovectomy on the frequency of bleeding, pain, articular mobility, and activities of daily living.

The clotting deficiency was corrected before treatment and during the following three days in order to reach clotting factor activity of 50%. Before intra-articular administration of ⁹⁰Y contrast fluid was injected into the joint under radiographic control to ensure that the needle was correctly positioned.⁶ The dosage of ⁹⁰Y was 2 mCi (74 MBq) for the wrist, elbow, and ankle and 5 mCi (185 MBq) for the knee. Within 24 hours after the injection, frontal and lateral scintigraphy were performed to check the distribution of the radioactive material in the joint. Following injection, the joint was immobilised by an elastic bandage and patients were confined to bed for 3 days. The frequency of haemarthrosis during the first and third year after treatment was compared with that which occurred during the year before radiosynovectomy. The average frequency of haemarthrosis during the follow up period was also assessed. The outcome was considered good if haemarthrosis decreased by 50-100%, moderate when the decrease was 25-49%, and failure when there was a reduction of less than 25%. The results of the questionnaire were also classified in similar terms.

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Accepted for publication
16 February 1993

Table 1 Evaluation of treatment

Joint No	Joint	Frequency of haemarthrosis before (0) and yearly after the treatment							Results according to patient
		0	1	2	3	4	5	6	
1	Knee	8	9	9	11	7			Failure
2	Knee	6	0	2	5	5	6		Moderate
3	Knee*	7	0	0	5	2	4	10	Moderate
4	Knee†	6	0	0	2				Moderate
5	Knee*	6	1	3	1	2	2		Good
6	Knee*†	6	1	0	0	0	0		Good
7	Knee	9	1	0	0	0			Good
8	Knee	12	1	1	0	6	0	0	Good
9	Knee*	8	0	0	0	0			Good
10	Knee†	3	0	0	0	0	0	0	Good
11	Ankle	7	1	4	5	7			Good
12	Ankle	4	0	2	2	2	1	6	Good
13	Elbow*	14	2	0	0	0	0	0	Moderate
14	Elbow	6	1	3	4	5			Moderate
15	Elbow	14	4	3	5				Good
16	Wrist	24	0	0	0	2			Good

*Clotting factor prophylaxis before the treatment; †Factor VIII inhibitor present.

Results

Five patients could not be evaluated, three because of insufficient data, one because follow up was inadequate, and in another, clotting factor prophylaxis was used to treat recurrent haematuria. Sixteen joints were therefore assessed involving 14 patients whose ages ranged from 7 to 46 years (mean 28). Ten patients, of whom three had factor VIII inhibitor, had haemophilia A, three had haemophilia B and one had factor VII deficiency. Five patients were treated prophylactically with a clotting factor preparation before radiosynovectomy without any influence on the bleeding frequency (table 1). After radiosynovectomy, prophylaxis was discontinued at the request of one patient. The average number of bleedings in the year before the radiosynovectomy was 8.8 (SD 5.2) which decreased markedly for 3 years after treatment. The patients reported good results in the questionnaire in 10 of 16 radiosynovectomies. The reduction in bleeding frequency was considered good in 15 joints after 1 year (table 2). In five joints which initially had a satisfactory outcome the bleeding frequency increased steadily with time, ultimately resulting in failure of the treatment.

After a year, nine of the 16 joints showed improved mobility of more than 10° whereas it remained unchanged in four joints. In one case, joint movement decreased by 45° owing to bleeding soon after treatment and by 10° in another because of injury. There was no clear explanation for a third patient in whom mobility was reduced by 10°. After 3 years data on mobility were available in 14 cases: there was still improvement in nine joints (average 15°), no change in three, and a decrease of 35° and 20°, respectively, in two cases.

Fourteen of the 16 radiographic examinations were available for this study. Eight joints with a Pettersson score less than four

before treatment showed a good result 3 years after treatment. In contrast, five joints with a Pettersson score of more than four before treatment showed only a moderate improvement, while one case was deemed a failure. There was only one complication caused by an unequal distribution of ⁹⁰Y, which resulted in a severe synovitis.

Discussion

There have been some reports about the short term effect of radiosynovectomy on the frequency of haemarthrosis in haemophilic patients⁹⁻¹² but, as far as we know, none on the long term evaluation of this treatment. In common with published data, a good initial response was noted in our centre during the first year after treatment. Thereafter the frequency of bleeding increased in five of the 15 responders, but a satisfactory response was maintained in the other 10 joints for 3 years and in some for 6 years. Two thirds of patients reported treatment to have been satisfactory and all but four were in agreement with the investigators' evaluation. The discrepancy might be explained by the fact that the patients took other factors into account, including change in pain, mobility, and functional capacity. The articular mobility did not deteriorate appreciably after radiosynovectomy, which compares favourably with surgical synovectomy.

The results indicated that the likelihood of a favourable response was higher in joints with no or little radiological damage, similar to the findings in patients with rheumatoid arthritis.⁶ As patients are often treated at a relatively young age, the risk of radiation exposure should be kept in mind. In our hospital the joint was immobilised after the injection for 3 days to reduce leakage of radioactive material, thereby lowering the risk of potential damage.^{13 14} The total body radiation load due to leakage of ⁹⁰Y in the knee joint was calculated to be 0.8 cGy,⁶ (the inguinal nodes and knee joint excluded), which is comparable with the effective dose equivalent of urography (1.8 cGy).¹⁵ After 30 years of radiosynovectomy treatment in rheumatology, no increased incidence of cancer or congenital abnormalities has been reported. On the other

Table 2 Evaluation according to investigator

Period	Outcome (number of joints)		
	Good	Moderate	Failure
1 Year	15	0	1
3 Years	10	4	2
At the end	10	0	6

hand, the advantages of radiosynovectomy over surgical synovectomy include a shorter stay in hospital, less requirement for clotting factor, shorter rehabilitation, no anaesthesia, no increase of joint mobility, and the simplicity of the procedure, making it an attractive method of treatment of recurrent bleedings in haemophiliac patients.

Our data suggest that radiation synovectomy is an effective and safe treatment of recurrent articular bleeding in haemophiliac patients, especially in joints with no or minor radiological damage.

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