

# Intraarticular glucocorticoid, morphine and bupivacaine reduces pain and convalescence after arthroscopic ankle surgery

## A randomized study of 36 patients

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**ABSTRACT** – In a double-blind randomized study, 36 patients undergoing arthroscopic removal of bony spurs and synovitis causing impingement of the ankle were allocated to intraarticular saline or bupivacaine 15 mg + morphine 5 mg + intraarticular methylprednisolone 40 mg.

Combined methylprednisolone, bupivacaine and morphine reduced pain, joint swelling, time of immobilization, duration of sick leave and return to sports after the arthroscopic procedure. In the treatment group, 1 patient had transitory purulent arthritis requiring antibiotics and arthroscopic synovectomy occurred.

Arthroscopic treatment of impingement of the ankle has become popular and patients regain full physical activity after 2–3 months (Jerosch et al. 1994, Hall et al. 1995, Sandmeier and Renström 1995).

In knee arthroscopy NSAIDs (Rasmussen et al. 1993) and combined intraarticular bupivacaine and morphine (Rasmussen et al. 1998) have reduced pain, the inflammatory response and convalescence. Addition of methylprednisolone may further reduce pain and convalescence (Rasmussen et al. 1998).

In this prospective, double-blind randomized study, we assessed the combined effect of intraarticular methylprednisolone, morphine and bupivacaine on pain and rehabilitation after arthroscopic ankle debridement.

## Patients and methods

68 patients were admitted for diagnostic or therapeutic arthroscopy of the ankle joint. Exclusion criteria (23 patients) comprised ankle instability, fewer than 6 months of symptoms, age < 18 or > 65 years, active peptic ulceration, hypersensitivity to NSAID, treatment with any antiinflammatory drug during the last 4 weeks before surgery, pregnancy, breast-feeding or intention to become pregnant. 45 patients were enrolled in the study after informed consent, and 36 patients in whom arthroscopy included debridement for impingement remained in the study. Diagnostic arthroscopy was performed in 9 patients. The patients were given 550 mg naproxen sodium twice a day for 10 days, starting on the evening before operation. Acetaminophen was given as escape analgesic for 10 days, starting immediately after arthroscopy. Ankle surgery as an out-patient was performed under general anesthesia with propofol and alfentanil, with tourniquet control. No distraction apparatus or prophylactic antibiotics were used. Standard anterolateral and anteromedial portals were employed starting anterolaterally. If necessary a posterolateral portal was used. A standard 2.7 mm 30 degree arthroscope was used in conjunction with a camera and video monitoring system. We removed hypertrophic synovitis with a safe-edge 3.5 mm resector, bony spurs with a 4-mm burr and loose bodies. The portals were closed with interrupted monofilament sutures. The operation time was median 45 (25–70) minutes. A

compressive dressing was applied postoperatively. Active exercises and full weight bearing were encouraged as soon as possible,

without restriction. Following completion of the procedure, a 22-gauge needle was placed intraarticularly. The surgeon, who was blinded to the type of treatment, administered the investigatory drugs, which were randomly allocated (envelope method) by an operating room nurse to group S: 5 mL 0.9% saline or group B+M+MP: 3 mL bupivacaine 5 mg/mL + 1 mL morphine 5 mg/mL + 1 mL 40 mg/mL methylprednisolone acetate (Depo-Medrol).

Pain scores (visual analogue scale (VAS) 0–100), use of crutches and return to work were used to assess the short-term effects, and joint effusion and return to sports were used to assess the long-term effects. On the day of operation, pain assessments were made at 3, 6, 12 and 24 hours postoperatively. During the following 10 days, and at 4 and 8 weeks' follow-up, the patients recorded the average intensity of pain at the end of each day on the VAS scale at rest, during normal walking, and heel and toe walking. Assessments included the number of hours of walking, use of crutches and acetaminophen, time without pain and return to usual work. All patients were instructed to resume their normal activities as soon as possible, with no restrictions. Clinical assessment of synovial effusion (yes or no) and range of motion were recorded preoperatively and at 10 days, 4 weeks and 8 weeks postoperatively.

The study was approved by the local ethics committee and was in accordance with the Declaration of Helsinki. The sample size was calculated on the basis of the amount of pain on the visual analogue scale and return to work. It was calculated for observations on the interval scale. Types 1 and 2 errors were both set at 5%. The estimated standard deviation on the visual analogue scale was set at 20. The smallest difference between the means not to be overlooked was set at 25. The number of patients in each group was calculated as 16. Since we estimated that 80% would complete the study, 36 patients were needed. The primary outcome measures were pain and return to work. Results are described with median and ranges, and analyzed using chi-square, Mann-Whitney, Wilcoxon and the analysis of variance

**Table 1.** Demographic data in patients undergoing arthroscopic debridement for impingement of the ankle who were given intraarticular saline (S) or bupivacaine, morphine and methylprednisolone acetate (B+M+MP)

	S	B+M+MP
Sex M/F	11/7	13/5
Age, years	32 (24–50)	33 (19–52)
Active in sports at the time of injury	14	14
Duration of symptoms (months)	12 (6–24)	12 (6–30)
Working at the time of operation	12	12
Active in sports at the time of operation	10	9
Synovitis	18	18
Bony spurs	18	18
Loose body	3	2

test, when appropriate.  $P < 0.05$  was considered significant. The statistical program Medstat was used to calculate sample size and perform a simple random allocation of the patients to two treatment groups, ensuring an equal number of patients in each group.

## Results

Patient demographics were similar in the two groups (Table). All 36 patients completed the study. At 3 hours postoperatively, 7 and 3 patients in group S and B+M+MP were not able to walk. Pain scores (area under the curve) at rest ( $p = 0.005$ ), while walking ( $p = 0.009$ ), and heel ( $p = 0.009$ ) and toe ( $p = 0.009$ ) walking were less in the B+M+MP group than in the S group (Figure 1). Total use of acetaminophen 500 mg tablets was less in the B+M+MP group (36 tablets) than in the S group (157 tablets) ( $p = 0.04$ ). In the S group, 7 patients and in the B+M+MP group, 13 patients managed without acetaminophen. The number of days until they became pain-free ( $p = 0.0004$ ), stopped using crutches ( $p = 0.0001$ ), and returned to work ( $p = 0.002$ ) were all reduced in the B+M+MP group, compared to the S group (Table 2). At 8 weeks, all patients had returned to work, except 2 in the S group. The number of days until they could start sports was fewer in the B+M+MP group than in the S group ( $p = 0.04$ ) (Table 2). At

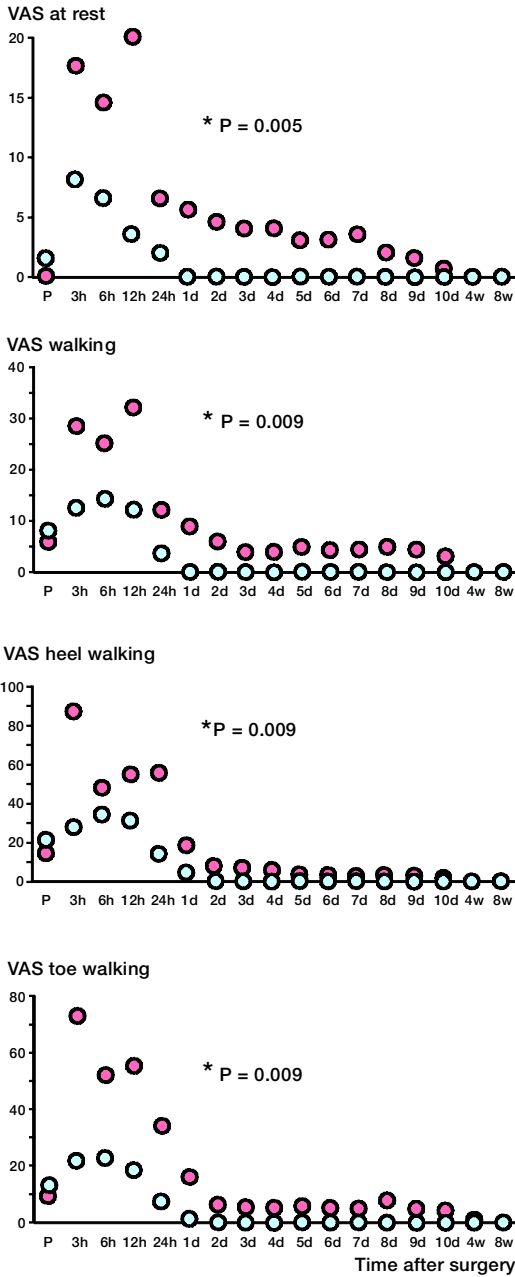


Figure 1. Postarthroscopic ankle debridement pain scores during mobilization in patients receiving intraarticular saline (red) or intraarticular bupivacaine + morphine + methylprednisolone (blue) (median values, preoperatively (p), hours (h), days (d) and weeks (w)).

8 weeks. 12 and 10 patients had resumed sports in the B+M+MP and S groups, respectively. At 4 weeks, joint effusion was found in 9 and 1 patients in groups S and B+M+MP, respectively (p =

Table 2. Days until pain-free, use of crutches, return to work and sports following ankle debridement with intraarticular saline (S) or bupivacaine + morphine + methylprednisolone (B+M+MP) (median days)

	S	B+M+MP	P-value
Painfree	10	1	0.0004
Use of crutches	4	1	0.0001
Return to work	7	2	0.002
Return to sports	30	21	0.04

0.009). At 8 weeks, joint effusion was found in 7 and 0 patients, respectively (p = 0.01).

1 patient in the B+M+MP group had an intraarticular infection with staphylococcus aureus. The infection responded well to arthroscopic synovectomy and intravenous antibiotics. At 4 and 8 weeks of follow-up, this patient had minor persistent symptoms, but had not returned to sports.

### Discussion

Following arthroscopic ankle debridement, patients are usually able to walk without support within 2–4 weeks, return to work after 1–2 months and resume athletic activity within 3–4 months (Jerosch et al. 1994, Hall et al. 1995, DeBerardino et al. 1997, Niek van Dijk et al. 1997).

Intraarticular local anesthetics are often used in the management and prevention of pain shortly after arthroscopic knee surgery, while intraarticular morphine has had inconsistent analgesic effects (Kalso et al. 1997). In a double-blind randomized study after arthroscopic meniscectomy, combined intraarticular morphine and bupivacaine showed a good analgesic effect extending into the late post-operative period (Rasmussen et al. 1998). Convalescence was also improved because the need for crutches and duration of sick leave were shorter and the ability to walk up and down stairs was better (Rasmussen et al. 1998). However, the main finding of the study was a further reduction in pain and functional impairment including the duration of convalescence (sick leave was reduced to median 3 days) by the addition of intraarticular methylprednisolone acetate 40 mg (Rasmussen et al. 1998). The mechanism was probably antiinflammatory, since swelling and the acute phase protein

response were also reduced or eliminated. Similarly, in patients with osteoarthritis of the knee, 10 mg triamcinolone acetonide relieved pain in a 24-hour period after arthroscopic debridement and synovectomy (Wang et al. 1998). Studies of other surgical procedures have also shown that glucocorticoids reduce postoperative pain without side-effects (Skjeldbred and Løkken 1982, Baxendale et al 1993). Some data indicate that glucocorticoids reduce bradykinin in inflamed tissue (Hargreaves and Costello 1990), but there may also be a direct inhibitory effect on transmission in nociceptive C-fibers (Johansson et al. 1990).

Intraarticular glucocorticoids may theoretically impair wound healing and increase the risk of infection. However, systemic effects have been observed, following a single dose in other surgical procedures (Schulze et al. 1992, 1997).

In our study, the combined use of an intraarticular local anesthetic, morphine and methylprednisolone had a pronounced and clinically relevant effect on rehabilitation after arthroscopic ankle debridement. 1 infection occurred in the intervention group which responded to arthroscopic synovectomy and intravenous antibiotics. Since purulent arthritis may have severe consequences, there is obviously a need for more large studies of intraarticular morphine-local anesthetic-glucocorticoid administration compared to the usual incidence of deep infections after ankle arthroscopy of around 1-2 % (Meislin et al. 1993, Ogilvie-Harris and Mahomed 1993, Ferkel et al. 1996, Rolf et al. 1996).

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