Skin Excision and Osteophyte Removal Is Not Required in the Surgical Treatment of Digital Myxoid Cysts

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Background: Digital myxoid cysts (DMCs) are ganglia of the adjacent distal interphalangeal joint (DIPJ) caused by leakage of fluid from the joint into the surrounding tissues. The connection between the DIPJ and the cyst can be identified by the injection of methylene blue into the DIPJ. However, the injection of methylene blue into the DIPJ is difficult and time-consuming. Based on this understanding of the cause of DMCs, we have used a surgical technique to treat DMCs without the need for skin excision. Herein, we have adapted the technique and demonstrated that precise leakage point identification is not required for treatment success, thus reducing the potential postoperative morbidity, reducing the operative time, and simplifying the surgical technique.

Design: This was a prospective, open, nonrandomized trial of therapy. A skin flap was designed to include the cyst and tissues from the cyst to the DIPJ. No skin excision was required, and no osteophyte removal was attempted.

Setting: University dermatology department.

Patients: Thirty-two consecutive symptomatic subjects with 26 finger DMCs and 6 toe DMCs. No patient had been previously treated.

Main Outcome Measures: Clinical assessment postoperatively and recurrence rate after a minimum follow-up of 8 months.

Results: Of the 26 finger DMCs, 24 (92.3%) remained healed at 8 months; and of the 6 toe DMCs, 2 (33.3%) remained healed at 8 months.

Conclusions: Digital myxoid cysts are caused by leakage of joint fluid from the DIPJ to the cyst. The leakage point is sealed in the healing process that occurs after a flap is raised and resited. The flap must be designed to include the undersurface of the cyst and the tissues between the DIPJ and the cyst. No skin excision or osteophyte removal is required. The procedure is not recommended for DMCs of the toes.

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The cause of digital myxoid cysts (DMCs) is controversial. Earlier researchers believed that the cysts are degenerative in origin and unrelated to the adjacent joint. Most authorities believe that DMCs arise as a result of joint fluid leaking from the distal interphalangeal joint (DIPJ). The connection between the cyst and the DIPJ can be demonstrated by the appearance of dye in the cyst after injection of dye into the DIPJ. The site of leakage can be identified by raising a flap of skin to expose the subcutaneous tissues between the cyst and the DIPJ. In an earlier study, it was shown that identification of the DIPJ leakage site using methylene blue (MB) injection into the DIPJ and division of the connection between the cyst and the joint resulted in cure of the digital cyst in 94% of finger and 57% of toe cysts. The principle objectives of successful surgery are debated. Some researchers believe that cyst removal is required. Others believe that osteophytes on the adjacent DIPJ have to be removed to ensure therapeutic success. One study has proposed that any procedure that results in the DIPJ leakage point being sealed over by fibrosis following a surgical or destructive procedure is likely to be successful.

In an earlier study using MB injections into the joint to identify the leakage site, surgery was also successful in 6 patients who had no demonstrable connection between the joint and the cyst. This suggested that precise identification of the joint leak site(s) was not essential for treatment success. It was hypothesized that the fibrosis that follows healing of the flap results in closure of the leak. Furthermore, because dye injection into the DIPJ is difficult and time-consuming, surgery would be easier if this stage was unnecessary. This principle has been tested by treating patients with myxoid cysts as described before but without first...
injecting MB dye into the DIPJ to identify the precise site of joint fluid leakage.

**METHODS**

All adults with DMCs presenting to me (C.L.) between May 26, 1999, and May 19, 2004, were prospectively studied and assessed for surgery. If the patient was asymptomatic and unassociated with any associated nail dystrophy, no active treatment was recommended. Only those requiring surgery are included. Active therapy was only recommended for symptomatic patients, i.e., those with pain and/or nail dystrophy, altered appearance of conservative management (reassurance, observation, and needling). Symptomatic patients who did not want surgery were offered cryosurgery. When a submatrix myxoid cyst was suspected, cryotherapy was not recommended. Preoperative radiographs were not routinely obtained. Before surgery, the following characteristics were noted: (1) digit involved, (2) cyst size (this included overlying the dorsum of the DIPJ), overlying the proximal nail fold, at the side of the DIPJ, or it was presumed to be submatrix in origin because of the presence of gross nail dystrophy with no visible cyst, (3) the presence or absence of associated nail dystrophy, (4) the presence of Heberden nodes on the affected digit, and (5) cyst duration.

Surgery was performed under a local anesthetic ring block using 2% plain lidocaine. An exsanguinating tourniquet was then applied. The site of the flap was determined by the position of the cyst in relation to the DIPJ (Figure 1). If more than 1 cyst was present on the digit, the site of the flap was determined by the largest cyst. A proximally based flap was designed to include the cyst plus any tissues between the proximal margin of the cyst and the DIPJ. During this procedure, the cyst was incised and the contents expressed or a distinct cyst cored out. The undersurface of this flap was blunt dissected so that the area under the cyst and the tissues back to the DIPJ were mobilized. Once the flap had been adequately extended, the submatrix was removed. Hemostasis was then obtained using bipolar diathermy, and the skin flap was resited and sutured into place using 5-0 polybutester (Novafil); no subcutaneous sutures were used. No skin was excised, and the cyst roof was left intact. A dressing was placed over the wound, and an antibiotic ointment applied. Dressings were removed at 6 to 7 days. An adhesive tape strip was sometimes applied to protect the flap tip after suture removal. Some patients continued to apply a daily adhesive dressing for a further week or so to prevent the wound edge catching on pockets. Patients were followed up for a minimum of 8 months to establish outcome.

**RESULTS**

Fifty-three subjects with DMCs were seen. Thirty-two (17 women and 15 men) of these subjects were symptomatic and opted for surgery (mean age, 62 years; age range, 33-76 years; duration of symptoms, 19 months; symptom range, 4-84 months), 16 on the left side and 16 on the right side. None had previously been treated. Twenty-six DMCs involved fingers and thumbs: 9 (1 with nail dystrophy) on the dorsum of the DIPJ and 15 (14 with nail dystrophy) over the posterior nail fold. Two, both with pronounced nail dystrophy, were submatrix in origin (Figure 2). Fifteen cysts arose on the middle finger, 6 on the index finger, 2 on the ring finger, 2 on the thumb, and 1 on the little finger. Six DMCs occurred on the toes: 2 on the side of the DIPJ, 2 on the dorsum of the DIPJ, and 2 over the posterior nail fold (1 with nail dystrophy). Heberden nodes were present on the DIPJ of the affected finger in 8 of the 26 finger cysts, but in none of the toe cysts.

Tourniquet times ranged from 2 to 6 minutes (mean, 4 minutes). The whole procedure took less than 30 minutes in all patients. The most significant factor determining the duration of the procedure was the speed of onset of the ring block. There were no intraoperative surgical complications.

After suture removal, all the flaps were intact, although in some instances the remaining attenuated cyst roof became crusted and sloughed off over the next 10 to 14 days. Complications included postoperative bleeding in one patient and a wound infection responding to oral antibiotics in another. Postoperative pain resulting in the need for acetaminophen occurred in most patients. In some patients, acetaminophen plus codeine phosphate was required. Pain persisting for 1 month was a feature of 2 patients, and 1 patient still complained of a painful finger at 8 months. New cyst formation at other sites was noted in 3 subjects. In 1 subject, there was limitation of joint mobility lasting a month.
At 8 months, 24 (92%) of 26 patients remained cured. Cysts located on the posterior nail fold (Figure 3) had a higher success rate (15 [100%] of 15 cysts) compared with those overlying the DIPJ (7 [78%] of 9 cysts) (Figure 4).

At 8 months, there was no joint limitation, tenderness, visible scarring, or nail dystrophy associated with surgery. A longitudinal nail groove or dystrophy associated with surgery. A longitudinal nail groove or dystrophy was present preoperatively in 17 (65%) of the 26 patients, and resolved in all patients. Recurrences occurred in 2 patients. One of these patients had a painful finger postoperatively, with crusting at the cyst site, and the cyst never disappeared. In the other patient, a recurrent cyst was visible under the flap at 4 months, although the nail groove had resolved. Patients designated as cured were followed up for a mean of 18 (range, 8-63) months. No recurrences occurred after 8 months.

TOES

Relapse occurred in 4 of the 6 patients treated, resulting in a cure rate of 33%. The 2 patients who responded both had a DMC arising at the side of the DIPJ. Three recurrences appeared at 3, 4, and 5 months postoperatively. One never healed completely, and a cyst was present at 8 months.

COMMENT

These results are identical to the MB-guided surgery technique, in which 94% of finger DMCs were healed at 8 months. A connection between DMCs and the DIPJ can
be demonstrated in almost 90% of patients.\textsuperscript{2,5} We believe that all DMCs arise as a result of joint fluid leakage from the DIPJ and, as such, can be considered ganglia of the DIPJ. It is not clear how the synovial fluid leaks from the joint into the surrounding connective tissue and why it usually accumulates around the proximal nail fold, sometimes remains over the joint, and rarely gets under the matrix, but is virtually never located proximally to the joint. Histoopathological studies show that the lesion starts with myxoid loosening of the connective tissue, with the lakes of mucinous material gradually enlarging and finally merging to 1 pseudocystic space. A lining, the hallmark of a true cyst, has never been found—so, in fact, it is a pseudocyst. This and previous work demonstrate that the principle of any treatment is to seal the leakage point and reduce the risk of further leakage occurring. This study shows that cyst and/or osteophyte removal is not always required and identification of the precise site of joint fluid leak using MB injection into the joint is not essential provided the flap is big enough to include the cyst-joint connection. The creation of a large flap potentially reduces the risk of ischemic complications, although this was not a complication seen in the previous study.\textsuperscript{3} The avoidance of MB joint injection makes the procedure shorter and technically less demanding; it also avoids the risk of needle injection, which causes joint capsule and flexor tendon injury.

Many other treatments have been advocated for the treatment of DMCs. This and previous studies demonstrate why such a large range of therapeutic maneuvers is successful. Any surgical or destructive therapy that causes scarring resulting in the leakage site being sealed over will be successful. Dermatologists have used needling,\textsuperscript{7} cryotherapy,\textsuperscript{8,9} infrared photocoagulation,\textsuperscript{10} laser destruction,\textsuperscript{11} and curettage. These procedures result in local tissue destruction and scarring. Skin excision and subsequent coverage of the defect with a local flap also produces good results.\textsuperscript{12} The present and past studies\textsuperscript{3} demonstrate that excision and flap closure works simply because the area between the cyst and the DIPJ is disrupted and subsequently scars over, sealing the leakage point. However, cyst removal and, thus, the need to create a flap to cover the subsequent defect is not actually required and complicates what is essentially a simple objective. Others\textsuperscript{6,13} have also emphasized the need for osteophyte removal. The tissue injury involved in achieving this outcome is also likely to result in extensive scarring around the joint, thus sealing any leakage site. This study shows that neither osteophyte removal nor skin excision is essential for treatment success.

The rationale for the use of triamcinolone injections is uncertain.\textsuperscript{14} It is difficult to see how these might work, and comparison of outcomes\textsuperscript{3} with the results of simple needling\textsuperscript{7} suggests the process of emptying the cyst before triamcinolone injection is the most important component of this therapy.

The results of operating on toes compared with fingers are poor, and this technique is not recommended for toe DMCs. The reasons for this site variation are not
understood, but may relate to differences in joint fluid pressure in the toe in the upright position.

In conclusion, raising a proximally based flap to include the cyst and tissues between the cyst and the DIPJ results in scarring, which seals the DIPJ leakage point. The technique works best on posterior nail fold cysts of the finger with associated nail dystrophy. Treatment is only required for symptomatic patients. New cysts can arise, and cysts do resolve spontaneously. The technique is not recommended for DMCs of the toe.

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REFERENCES


Dermatology online with interactive technology is being offered as a free interactive e-learning platform for undergraduate and postgraduate students in dermatology and is available through www.swisdom.org. The editor of this platform is Professor G. Burg, with coeditors Professors T. Rufli, R. Panizzon, L. Braathen, T. Hunziker, P. Elsner, S. Lautenschlager, and Drs J. Gorog, R. Kropf, C. Cipolat, U. Bader, and C. Gerber. Coordinators are C. Mnich and V. Djamei. The interactive program is offered in English, French, and German with translations provided by Dr W. Burgdorf. Programming is provided by Arpate AG, Kusnacht/CH. For a free access account, please contact doit@usz.ch.