

DIGITAL MUCOID CYSTS

Robert M. Goecker, DPM

Mucous cysts are small cystic lesions that occur intradermally on the dorsal aspect of the interphalangeal joint and distal phalanx of the digits. These lesions closely resemble ganglion cysts histologically. Synonyms for digital mucoid cysts include cutaneous synovial (myxoid) cyst, focal cutaneous mucinosis, digital synovial cyst and dorsal digital ganglion cyst. These cysts are commonly seen by the foot and ankle surgeon. A review of these lesions including surgical treatment options is presented.

LITERATURE REVIEW

Digital mucoid cysts were first described by Hyde and Montgomery in 1883.^{1,2} Synonyms for digital mucoid cysts include cutaneous synovial (myxoid) cyst, focal cutaneous mucinosis, digital synovial cyst and dorsal digital ganglion cyst.² All of these common descriptive names can be summarized as dermal “teno-arthrosynovial hernias.”³ Cysts have similar histology and characteristics with loosely formed degenerative connective tissue and a viscous jelly like component.⁴ All cysts reveal myxoid degeneration histologically but differ in their body location. Ganglion cysts occur below the skin in the subcutaneous layer versus mucoid cysts which are present within the dermal layer.⁵ Digital mucoid cysts are soft, smooth, raised, oval to round, translucent, white to pink, solitary, slow-growing structures that are usually seen distally on toes and fingers. These lesions have a

classic clinical appearance although other conditions such as pyogenic granuloma, inclusion cyst, dermatofibroma, Herberden’s node, angioleiomyoma should be considered in a differential diagnosis if there is any uncertainty.⁶

There are two types of digital mucoid cysts that have a similar clinical appearance however they are different in both location and etiology. These cystic nodules or papules can occur periungually or over the distal interphalangeal joint. The most common type generally arises from the interphalangeal joint of the toe by herniation of the tendon sheath or joint lining. The other cause results from localized fibroblastic proliferation near the proximal nail fold and is not connected to the joint space or tendon sheath (Figure 1).^{1,6,7}

These lesions are usually asymptomatic although when the cysts become larger more associated problems arise. Usually, the larger lesions become painful secondary to shoe pressure. Occasionally the cysts also disturb nail growth. Nail dystrophies such as a longitudinal depression or ridging may be noted on the adjacent nail plate.

This condition is most common in middle aged and elderly patients and is very uncommon in young patients. Mucoid cysts are usually seen between the age of thirty and eighty with a predilection for women.⁶ However, Calder et al did describe one patient who was 16 years old.¹ Historically the great toe has been described as the most common location for these lesions although two large retrospective studies discussing these lesions on the



Figure 1A. A classic digital mucoid cyst over the second distal interphalangeal joint.

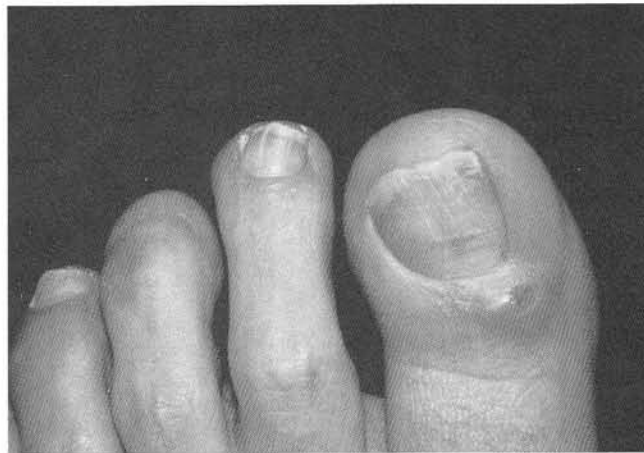


Figure 1B. A classic digital mucoid cyst in the periungual region of the hallux.

feet noted a much greater incidence in the second and third toes.^{1,5,6} The etiology is unknown although trauma and arthritic changes have been implemented.^{1,7} The author believes osteoarthritic changes in the distal interphalangeal joint are an inciting factor for this type of lesion (Figure 2). The pathogenesis of these lesions has been linked to an alteration of fibroblast function from the usual production of collagen to mucin (hyaluronic acid). The histology reveals an increased number of irregular angulated stellate-shaped fibroblasts dispersed in a myxomatous stroma with basophilic amorphous replacement of dermal collagen.⁸ Skin overlying these cysts can be quite thin at times and they may ulcerate.

Diagnostic modalities have been described as a useful tool for the study of these lesions. Digital mucoid cysts are spherical fluid filled structures that have a well defined wall. Differentiating the origination of the cyst can be accomplished with the Newmeyer test which entails injecting radiopaque dye into the interphalangeal joint and then observing if the cyst fills on a radiograph. If the cyst fills there is an extension into the joint.⁶

Also, ultrasound has been described as beneficial in differentiating these lesions in the hand from other soft tissue pathology such as tenosynovitis and pigmented villonodular synovitis.⁹ Magnetic resonance imaging also provides clarification and insight of the pathophysiology of digital mucoid cysts. Drape et al reviewed MR findings in 23 patients with digital mucoid cysts. All lesions were noted to have a high signal intensity and sharp border on T2-weighted images. Of the 23 patients 19 (83%) had cysts with pedicles that extended to the distal interphalangeal joint. Osteoarthritis of the interphalangeal joint was noted in 16 patients (70%). Intracystic septa

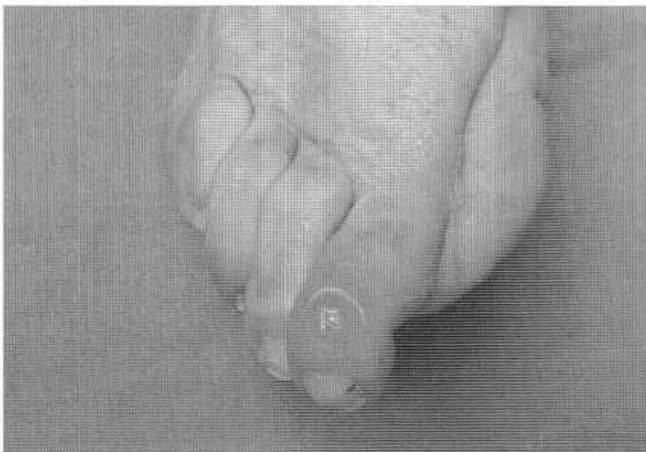


Figure 2A. An arthritic DIPJ with an overlying digital mucoid cyst that is ulcerated.

were present in nine patients (39%). A few of the cysts were independent of the joint and had a polymorphic appearance extending beneath the nail bed.⁷

TREATMENT

A variety of treatment options have been described.^{1,6,10-20} Traditionally, recurrence rates were very high for incisional and injectional approaches.^{6,13-18} The greatest risk of recurrence is associated with simple puncture of the cyst since it minimally disturbs the dermal layer allowing the cyst to reform within two months greater than 50 percent of the time. Attempts at multiple repeated punctures also fail with similar rates.⁶ When incised the cyst extrudes a thick, clear, jelly-like substance that tends to refill within two months (Figure 3). The use of cortisone has had no effect on the success of cyst drainage. More successful treatments have been described. Draining the cyst followed by derroofing the lesion and cauterizing the base (electrodessication) is more efficient with a recurrence rate of 40 percent although painful healing and scarring can be problematic.¹⁵ Sclerosing injections (4 percent alcohol) into the cyst reportedly dropped the recurrence rates to 30 percent.¹⁶

Cryosurgery has been described as an effective alternative method for treatment of digital mucoid cysts.¹²⁻¹⁴ Cryotherapy with liquid nitrogen is commonly used by dermatologists with success. Literature supports puncturing the cyst followed by the use of a double freeze thaw cycle (FTC) due to the high rate of recurrence with single



Figure 2B. Close-up radiographic findings in the above patient with arthritis. Arthritis is common in patients with interphalangeal joint mucoid cysts.

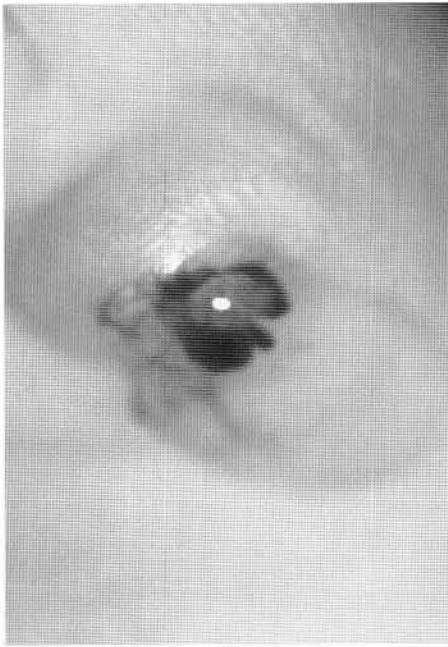


Figure 3. Clear jelly-like substance can be drained from these lesions. Simple puncture alone is a very unsuccessful treatment option.

FTC.¹¹ Two freeze thaw cycles are carried from the cyst all the way to the transverse skin creases over the interphalangeal joint. Each freeze time used is approximately 30 seconds after the freeze (ice) field is established. A second treatment at least 4 minutes later is utilized for the double freeze cycle to increase the rate of success. Dawber et al noted successful eradication of 12 out of 14 lesions with a two to five year follow-up with the cryosurgical technique. One patient failed a second double freeze thaw cycle treatment and the other declined additional treatment. There was no significant post-cryosurgical morbidity and cosmetic outcomes were excellent without evidence of scarring.¹⁴ Bohler-Sommeregger et al described a slightly different technique. There were 7 recurrences of 19 cysts treated with an average recurrence time of 9.4 months although six of the seven recurrences were single freeze thaw cycles. Therefore they also recommended a double freeze thaw cycle. Their technique included puncturing the cyst followed by cryosurgery with liquid nitrogen until the front extends 2 mm beyond the cyst then an approximate 1 to 2 minute thaw followed by another treatment. Healing time was approximately 21 to 30 days.¹¹

Carbon dioxide laser has also been described as an effective treatment at eliminating digital mucoid cysts.^{19,20} Huerter et al noted successful elimination of ten lesions with follow up ranging from 14 to 44 months.¹⁹ Karrer et al noted successful treatment in 4 of 6 cysts treated with carbon dioxide laser. The recurrences occurred at 3 weeks and 11 months postoperatively. Their recommendation

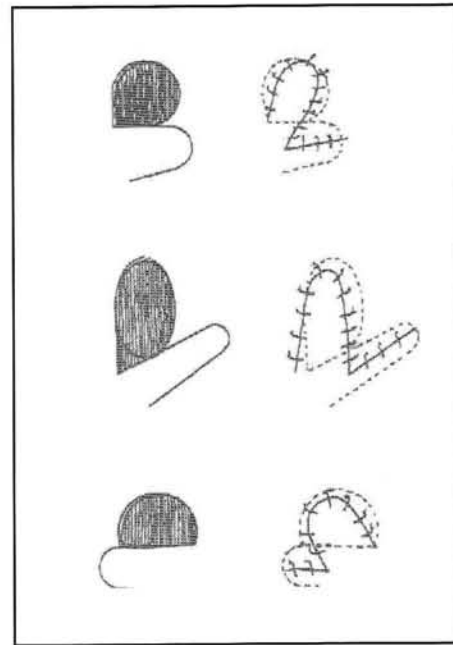


Figure 4. Schrudde transpositional and rotational skin flap for either circular, oval or semicircular defects (redrawn from Dockery⁶).

was to avoid surgery until the simple laser treatment had been performed since there was little morbidity and the preliminary results were promising.²⁰

Complete surgical excision (3 to 1 ellipse) of the lesion increases success rates above 70 percent.⁶ In general, if the skin lesion is small and occurs directly over the interphalangeal joint, a traditional 3:1 excisional elliptical biopsy parallel with the transverse relaxed skin tension lines should be performed, which allows exposure to the interphalangeal joint for arthroplasty and also eliminates redundant skin, therefore, increasing the stability of the toe. Surgical excision with debridement of bone (partial phalangectomy under the cyst) reportably increases success.²¹ Calder et al has reported successful removal of 14 of 15 mucous cysts on toes after 24 month follow up with simple excision of the lesion and joint debridement without the use of skin flaps. All patients were pleased with cosmetic appearance of their toe.¹ However, osseous procedures will not address cysts in the periungual areas. If the lesion is too large or is closer to the nail plate, the tightness in the adjacent tissues requires the use of a Schrudde flap (slide swing rotational single lobed flap). The Schrudde flap is a single lobed flap that is a combination of a rotational and transpositional flap. The pedicle (base) has an incoming blood supply to insure success. The combination transpositional and rotational flap is ideal in that instance because it adequately distorts the skin leaving no direct communication for the cyst to be re-established (Figure 4). Three

modifications of the Schrudde flap exist to correct circular, oval and semicircular defects. When puckering occurs, a Burow's triangle can be cut at the pivot point although it should always be excised away from the flap not to compromise the flap.¹⁰ The best overall treatment results come from complete excision of the cyst with bone debridement of irregular joint osteophytes and a rotational skin flap for closure. This has been described as 94% successful. Complete surgical excision with skin flap provided significant success (one failure out of 24 patients) with follow up >1 year in 25 cases. Concomitant bone removal was performed in only three cases. This type of treatment also provides an excellent cosmetic appearance and least amount of recurrence. The Schrudde skin flap is commonly employed for this type of

procedure. A clinical example of a large muroid lesion pre and postoperatively is presented (Figure 5). Potential postoperative complications associated with surgery other than recurrence include nail ridging, wound infection, hematoma and scarring although the risks are very low.²²

SUMMARY

Digital muroid cysts are common soft tissue lesions that can be successfully treated with different modalities with low morbidity. Cryosurgery and or surgical excision with or without bone excision and flap closure can be utilized successfully. The exact technique varies depending on the patient circumstances, lesion location (periungual or interphalangeal) and physician preferences.



Figure 5A. A preoperative example of a large digital muroid cyst.



Figure 5B. Preoperative radiograph demonstrating an exostosis at the medial hallux interphalangeal joint.



Figure 5C. Postoperative radiograph after exostectomy.



Figure 5D. Postoperative clinical appearance 1 year after Schrudde flap and exostectomy.

REFERENCES

1. Calder JD, Buch B, Hennessy MS, Saxby TS. Treatment of mucous cysts of the toes. *Foot Ankle Int* 2003;24:490-3.
2. Hernandez- Lugo AM, Dominquez-Cherit J, Vega-Memije ME. Digital mucoid cyst: the ganglion type. *Int J Dermatol* 1999;38:533-5.
3. Armijo M. Mucoid cysts of the fingers. Differential diagnosis, ultra-structure and surgical treatment. *J Dermatol Surg Oncol* 1981;17:317-22.
4. Nishimura M, Kohda H, Takazono I, Tanaka Y. Chemical components of jelly-like matrix in digital mucous cyst. *Clin Exp Dermatol* 1985;10:116-20.
5. Lemont H. Common myxoid cysts of the foot. *Lower Extrem* 1995;2:263-5.
6. Dockery GL. Digital mucoid cysts: Diagnosis and treatment. *J Foot Ankle Surg* 1994;33:326-33.
7. Drape JL, Idy-Peretti I, Goettmann S, Salon A, Abimelec P, Guerin-Surville H, Bittoun J. MR imaging of digital mucoid cysts. *Radiology* 1996;200:531-6.
8. Reynolds FD, Lemont H. Cutaneous synovial cyst: a case report and review. *J Am Podiatric Assoc* 1984;74:42-5.
9. Bianchi S, Abdelwahab IF, Zwass A, Calogera R, Banderali A, Brovero P, Votano P. Sonographic findings in examination of digital ganglia: retrospective study. *Clin Radiol* 1993;48:45-7.
10. Dockery GL. Single-lobe rotation flaps. *J Am Podiatry Assoc* 1995;85:36-40.
11. Bohler-Sommeregger K, Kutschera-Hienert G. Cryosurgery management of myxoid cysts. *J Dermatol Surg Oncol* 1988;14:1405-8.
12. Bardach HG. Managing digital mucoid cysts by cryosurgery with liquid nitrogen: preliminary report. *J Dermatol Surg Oncol* 1983;9:455-8.
13. Sonnex TS, Leonard J, Ralfs I, Dawber RPR. Myxoid cysts of the finger. Treatment by liquid nitrogen spray cryosurgery. *Br J Dermatology* 1982;107:Suppl 21-2.
14. Dawber RPR, Sonnex TS, Leonard J, Ralfs I. Myxoid cysts of the finger. Treatment by liquid nitrogen spray cryosurgery. *Clin Exp Dermatol* 1983;8:153.
15. Sonnex TS. Digital myxoid cyst: a review. *Cutis* 1986;2:89-94.
16. Dockery GL, Nilson RZ. Intralesional injections. *Clin Pod Med Surg* 1986;3:473-85.
17. Salasche SJ. Digital mucoid cyst ñ surgical excision. *J Dermatol Surg Oncol* 1984;10:35-9.
18. MacCollum MS. Mucous cysts of the fingers. *Br J Plast Surg* 1975;28:118-20.
19. Hueter CJ, Wheeland RG, Bailin PL, Ratx JL. Treatment of digital myxoid cysts with a carbon dioxide laser vaporization. *J Dermatol Surg Oncol* 1987;13:723-7.
20. Karrer S, Hohenleutner U, Szeimies RM, Landthaler M. Treatment of digital mucous cysts with a carbon dioxide laser. *Acta Derm Venereol* 1999;79:224-5.
21. Laine W. Mucinous pseudocysts of the toes: an effective surgical method of treatment. *Cutis* 1990;46:169-70.
22. Fritz GR, Stern PJ, Dickey M. Complications following mucous cyst excision. *J Hand Surg Br* 1997;22:222-5.