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No pain no gain: tender nodules in a competitive bodybuilder

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Abstract

The subculture of bodybuilding is rife with people willing to do whatever is necessary to achieve the perfect physique. One particularly concerning behavior is the injection of site-enhancing-oils (SEO) into lagging muscle groups to achieve instant size and symmetry. The typical SEO is a combination of lidocaine, alcohol, and oil; it is rarely, if ever, administered by a qualified professional. As a result, there are a variety of potential complications that can manifest in the skin and other organ systems. In our case, a 41-year-old former competitive bodybuilder was referred to our clinic for excision of a subcutaneous nodule. The initial histopathology was concerning for lymphoma, but a more thorough history and review of systems were completely negative. The patient underwent a negative systemic lymphoma workup and it was not until we discussed the prospects of radiation and other forms of treatment that he revealed a history of SEO use, as well as other identical nodules on his body. Subsequent excisions revealed a more classic sclerosing lipogranuloma-type reaction pattern. Owing to the taboo nature of SEOs, most patients are reluctant to provide this vital piece of historical information, highlighting the importance of patient rapport and clinical-pathologic correlation in our specialty.

Keywords: bodybuilding, complications, Synthol, oil injection, cutaneous lymphoma, sclerosing lipogranuloma

Introduction

Site enhancing oils (SEO's) are a mixture of alcohol, lidocaine, and medium chain triglyceride oils that can be injected intramuscularly to achieve instant

gains in perceived muscle size and symmetry. This practice is on the rise among bodybuilders and other individuals desperate to improve their physique. With improper placement, the complications can be fatal, but more commonly are limited to the skin and soft tissue surrounding the injection site. Unfortunately, it is nearly impossible to diagnose a complication of SEO misuse solely on clinical or histological grounds; the number of potential clinical presentations and histological reaction patterns are numerous. To complicate matters, patients are often reluctant to admit to SEO use. We present the case of a former competitive bodybuilder who presented for a **"routine cyst excision"** that turned out to be far from routine.

Case Synopsis

A 41-year-old gentleman presented to clinic for a **"routine cyst excision" on his right shoulder**. The nodule had been present for over a decade and was not growing or changing, but it was occasionally tender to palpation. He was previously evaluated by a family practitioner who attempted to deflate the **"cyst" through a 4mm punch trephine, but was** unable to express any keratinous debris and subsequently referred the patient to the dermatology department. His medical history was significant for a myocardial infarction in his 30s; upon further questioning he explained that he was previously a professional bodybuilder and his heart attack was related to a combination of pre-workout stimulants and increased blood viscosity stemming from exogenous testosterone use. His grandmother had non-Hodgkin lymphoma and the remainder of his history was noncontributory.



Figure 1. Clinically, the patient presented with an otherwise normal appearing right posterior shoulder. There was a palpable deep nodule on exam with no overlying skin changes.

Dermatologic exam revealed a muscular gentleman with an otherwise normal-appearing right shoulder (Figure 1). Palpation of the skin overlying the right posterior deltoid revealed a deep, firm, relatively immobile nodule measuring approximately 2cm in diameter with no overlying skin changes.

The nodule was excised in a fusiform fashion as if it were a ruptured cyst with foreign body reaction. The initial dissection revealed marked fibrosis in the superficial adipose. Dissection was continued deeply and laterally in hopes of achieving a margin of seemingly normal adipose. The specimen was placed in formalin and submitted for histopathologic examination. Initial sections showed dense fibrosis of the reticular dermis and superficial adipose encasing well-formed follicles of large epithelioid lymphocytes with scattered plasma cells and histiocytes (Figure 2). Architecturally, there was immediate concern for follicular B cell lymphoma versus reactive lymphoid hyperplasia, and additional immunohistochemical studies were performed to further characterize the infiltrate (Figure 3). The follicles were composed primarily of CD20+ B lymphocytes with lesser populations of CD4+ and CD8+ T lymphocytes and CD68+ histiocytes. Stains

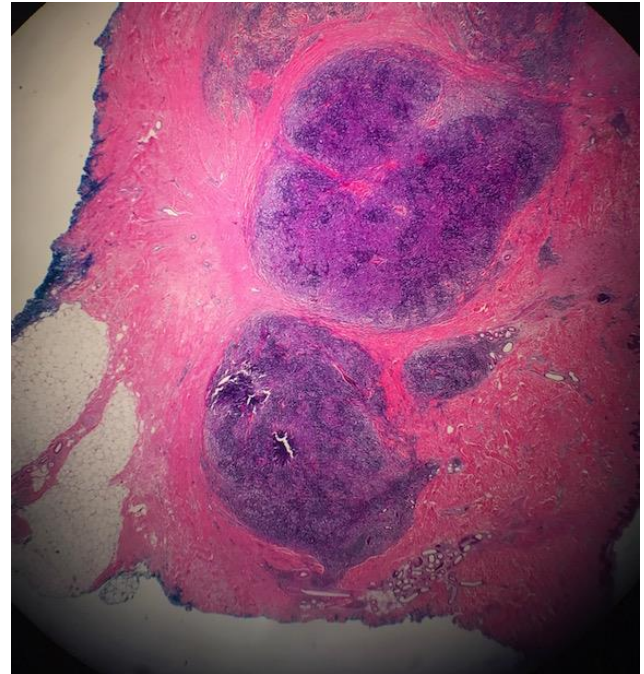


Figure 2. Histological examination of the initial excision showed multifocal nodular areas of dense lymphocytic infiltrate within the dermis. Between the cellular areas, there was dense dermal fibrosis. Within the cellular areas there were two distinct cell populations with small mature lymphocytes surrounding the nodular aggregates of larger, more atypical, epithelioid lymphocytes. Based on routine staining with H&E (2 \times), the differential diagnosis included a reactive versus malignant lymphoproliferative process.

for BCL-6 and BCL-2 were both positive. The slides were first reviewed within our own department by multiple board certified dermatopathologists and then independently reviewed by a prominent cancer institution as well. Both sets of pathologists agreed that the findings were concerning for cutaneous follicular lymphoma, possibly from an underlying nodal lymphoma given positive immunohistochemistry for both BCL-2 and BCL-6.

The patient was contacted by phone and sounded quite puzzled by his diagnosis. A full review of systems was negative including targeted lymphoma questions (weight loss, fatigue, night sweats, bruising, epistaxis, or pallor). The patient reluctantly agreed to undergo a more complete lymphoma workup, but he strongly doubted the diagnosis. Laboratory studies including CBC, CMP, HIV, RPR, hepatitis B and C, LDH, beta 2 microglobulin, IgA, IgD, IgE, IgG, and IgM were unremarkable. A full body CT scan failed to reveal any lymphadenopathy and

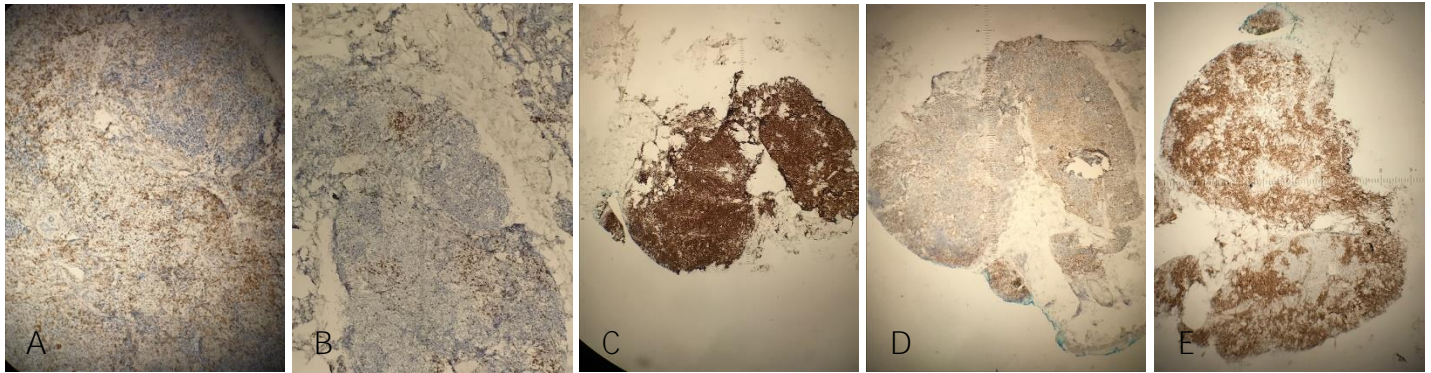


Figure 3. A) A panel of immunohistologic stains were ordered to further characterize the infiltrate. Depicted here is a stain for CD4 (4 \times), revealing a small population of the mature small lymphocytes. B) A second subset of mature small lymphocytes stained positive for CD8 (4 \times), suggesting a mixed T cell population. C) The majority of the large atypical and smaller, mature lymphocytes stained positive for CD20 (2 \times), revealing a strong B cell lineage within the mixed infiltrate. Given the overall architecture and concern for lymphoma, we pursued additional B cell stains. D) Immunostaining for BCL-6 was ordered given the overall follicular appearance of the nodular aggregates and was diffusely positive. In isolation, this is a staining pattern seen in primary cutaneous follicular lymphoma (2 \times). E) Immunostaining for BCL-2 was ordered as well and was also diffusely positive (2 \times). In combination with BCL-6 positivity, this combination of findings arises concern for cutaneous spread from an underlying nodal follicular B cell lymphoma.

the complementary PET scan failed to reveal any FDG-avid lesions other than his healing surgical site (Figure 4). Peripheral blood flow cytometry did not show an aberrant peripheral lymphocyte population. He was then referred to a cutaneous lymphoma specialist who reiterated the highly unusual nature of his case and recommended a bone marrow biopsy

as well as additional consultations with both medical and radiation oncology. The patient declined all aspects of the proposed plan and requested to be sent back to the original dermatology clinic for all future care.

The patient was seen two weeks later for follow up at which time the authors learned that he had multiple identical nodules elsewhere on his body. He ultimately divulged his past use of an SEO named "Synthol Pump n Pose," which he injected into his right posterior deltoid and bilateral triceps muscles nearly 20 years ago. Repeat exam revealed two additional palpable deep nodules on his bilateral triceps muscles, which he agreed to have excised. During the procedure the authors were able to directly visualize discrete, firm nodules adherent to the fascia of both triceps muscles. Histologically the nodules showed interstitial vacuoles of varying sizes, brisk fibrosis, and an abundant chronic lymphohistiocytic infiltrate including multinucleated foamy histiocytes with deep penetration through the skeletal muscle fibers of the triceps (Figure 5). Review of the literature later confirmed that both lymphoid follicles and sclerosing lipogranuloma are among the many histological reaction patterns reported with extra-muscular injection of SEOs. The patient continues to follow up in the dermatology clinic with no further issues thus far.



Figure 4. PET scan failed to reveal any hypermetabolic lesions aside from the healing surgical site on the right posterior shoulder.

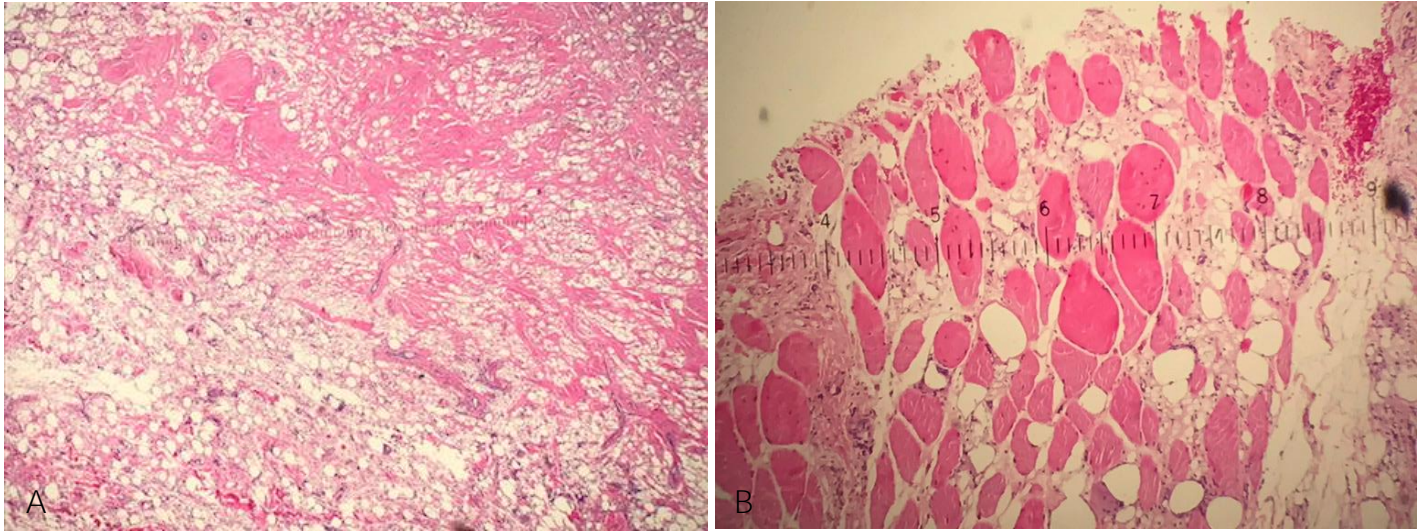


Figure 5. A) The second excision showed much different histologic features, with marked fibrosis and chronic lymphohistiocytic dermal and subcutaneous inflammation. Histiocytes forming multinucleated giant cells with foamy cytoplasm were abundant. In addition to the granulomatous and xanthomatous changes, there were prominent interstitial vacuoles of variable sizes within the interstitial dermis and adipose. There was no cellular atypia identified anywhere within the specimen. These findings are classic for sclerosing lipogranuloma to an injected oil. H&E, 4x. B) The lipid vacuoles extended into the skeletal muscle bundles of the triceps, which was consistent with the patient's reported history of intramuscular injections of site enhancing oil. H&E, 10x.

Case Discussion

The origins of site enhancing oils (SEOs) can be traced back to 1899 when the Austrian surgeon Doctor Robert Gersuny injected Vaseline petroleum jelly into the scrotum of a patient who had lost both testicles after a bout of tuberculous epididymitis [1]. In the decades that followed, people would explore applications of numerous other primitive fillers in hopes of finding the perfect injectable to repair, restore, refine, or enhance their bodies. The medical literature has chronicled the conquests and magnificent failures of these pioneers, with highlights including injections of sunflower oil for breast enhancement [2], injections of vitamin E for facial rejuvenation [3], and a few hundred cases of injections of various substances (paraffin, mineral oil, cod liver oil, olive oil, motor vehicle transmission oil) into the penis and scrotum for male enhancement [4-6].

For obvious reasons, word of SEOs soon spread to the subculture of bodybuilding where the goal of all competitors is to achieve the perfect physique. Despite the use of anabolic steroids, most athletes will have a muscle group that lags behind the others and disrupts the overall symmetry of their appearance on stage. Site enhancing oils were seen

as a simple solution to circumvent stubborn muscle groups and they were so widely adopted that their use is considered a public health issue in certain countries [6, 7]. A variety of substances have been reported in the literature, including paraffin [6], ADE (a mix of vitamins A, D, and E in a vegetable oil base), [6], sesame oil [6, 8], walnut oil [6], and coconut oil [9]. The most widely used SEO currently is Synthol, which was created in 1997 by the bodybuilder Chris Clark. Synthol is a mixture of 85% medium chain triglyceride oil, 7.5% lidocaine, and 7.5% ethanol, which is ideally injected intramuscularly [6].

Contrary to popular belief, SEOs do not produce long term results and are actually intended to be used immediately before posing on stage. Injection of the oil causes an inflammatory effect with subsequent swelling and increased perceived muscularity, but there are no long-term gains in muscle growth. Depending on the substance, materials can remain stable from months to decades within the muscle [6]. Unfortunately, many people have been led to believe that SEOs are a safer alternative to anabolic **steroids by "lay experts" in online forums [7]; on the contrary, the complications of SEOs are well documented in the literature and, if anything, are on the rise. The most common complications are related**

to the skin and soft tissue around the injection site and the patient can present with neuropathy, erythema, infection, abscess formation, or subcutaneous nodules [8]. Intramuscular cyst formation has been reported in several cases, with some patients experiencing almost complete replacement of normal muscle with cystic scar tissue [8, 9]. In one case, a patient developed spontaneous ulceration years after using Synthol, ultimately requiring antibiotics, surgical debridement, and negative pressure wound therapy [10]. In the unfortunate case of intra-arterial injection, SEO use has been linked to pulmonary oil emboli, myocardial infarction, and cerebrovascular events [11].

For personal and potentially legal reasons, patients will not openly divulge their history of SEO use, which can make it hard to diagnose on clinical grounds. It is fairly easy to identify people who are grossly abusing SEOs as they will be obviously deformed; in extreme cases the inflated muscle will actually droop under gravity. Detection in professionals is subtler and requires a keen and methodical exam. Palpation is essential, as the affected muscles can be cystic or painful and they are often less dense than surrounding muscle groups. Additionally, injected muscles will have a swollen appearance compared to normal muscle, with a noticeable loss in muscle definition (fewer striations, indistinct separation between muscle bellies of adjacent muscle groups), [6]. It is equally difficult to diagnose SEO abuse on histological grounds and misleading clinical diagnoses are certainly a contributing factor. In a review of subcutaneous nodules later confirmed as SEO abuse, not a single clinician listed SEOs as a possibility in their differential diagnosis. The pathologic specimens in

the study were submitted as cysts, abscesses, gouty tophi, rheumatoid nodules, or soft tissue neoplasms [12]. To further complicate matters, SEOs have no pathognomonic histological features. Typical findings include foreign body giant cells, foamy histiocytes, sclerosis, calcification, lymphoid follicles, and fat necrosis in various combinations. In serendipitous cases, the sections may show variable-sized vacuolar spaces corresponding to oil droplets that washed out during processing [12]. With regard to lymphoid follicles, it is essential to rule out a true lymphomatous process. However, it is possible to have BCL-2 and BCL-6 positivity in reactive lymphoid hyperplasia and reactive T cells in general can express BCL-2 [13, 14].

This case serves as a good reminder of the importance of clinical-pathologic correlation in dermatology. The patient had an initial pathology specimen that was concerning for lymphoma, but no other compelling reasons to suspect an underlying malignant process. With a more thorough history, a bit of honesty on the part of our patient, and additional excisions for histopathologic examination, the authors were able to not only provide the patient with the correct diagnosis, but also spare him from potentially harmful, unnecessary treatments.

Conclusion

It is important for clinicians to be aware of the existence of site enhancing oils, the patient demographics most prone to use, and the potential complications of their misuse. This case could not have been diagnosed without the honesty and trust of the patient.

References

1. Gersuny R. Harte und weiche paraffinprothesen. *Zentralbl Chir.* 1903;30:1.
2. Sarica O, Kayhan A, Demirkurek HC, Igdem AA. Subcutaneous oleomas following sunflower oil injection: a novel case and review of literature. *J Breast Health.* 2016;12(3): 141-44. [PMID: 28331751].
3. Robenzadeh A, Don PC, Davis I, Weinberg JM. Sclerosing lipogranuloma secondary to supposed vitamin E injection for facial rejuvenation: successful treatment with intralesional steroids. *Dermatol Surg.* 1998;24(9): 1036-7. [PMID: 9754095].
4. Bjurlin MA, Carlsen J, Grevious M, Jordan MD, Taylor A, Divakaruni N, Hollowell CM. Mineral oil-induced sclerosing lipogranuloma of the penis. *J Clin Aesthet Dermatol.* 2010;3(9): 41-4. [PMID: 20877525].
5. Watanabe D, Isono M, Shinci M, Masunaga A, Ito K, Shimazaki H, Asano T. Case of primary scrotal sclerosing lipogranuloma: review of 227 cases reported in Japan. *Hinyokika Kyo.* 2014;60(11): 587-91. [PMID: 25511949].
6. Figueiredo VC, Silva PR. Cosmetic doping: when anabolic steroids are not enough. *Sub Use Misuse.* 2014;49(9): 1163-7. [PMID: 24915171].
7. Hall M, Grogan S, Gough B. Bodybuilders' accounts of synthol use: The construction of lay expertise online. *J Health Psychol.*

- 2016;21(9): 1939-48. [PMID: 25645936].
8. Banke IJ, Prodinge PM, Waldt S, Weirich G, Holzapfel BM, Gradinger R, Rechl H. Irreversible muscle damage in bodybuilding due to long-term intramuscular oil injection. *Int J Sports Med.* 2012;33(0): 829-34. [PMID: 22592548].
 9. Hameed M, Sahu A, Johnson MB. Muscle mania: the quest for the perfect body. *BMJ Case Rep.* 2016;2016. [PMID: 27908914].
 10. Ikander P, Nielsen AM, Sorensen JA. Injection of synthol in a bodybuilder can cause chronic wounds and ulceration. *Jgeskr Laeger.* 2015;177(20). [PMID: 25967249].
 11. Pupka A, Sikora J, Mauricz J, Cios D, Plonek T. The usage of synthol in the body building. *Polim Med.* 2009;39(1): 63-5. [PMID: 19580174].
 12. AbdullGaffar B. Illicit injections in bodybuilders: a clinicopathologic study of 11 cases in 9 patients with a spectrum of histologic reaction patterns. *Int J Surg Pathol.* 2014;22(8): 688-94. [PMID: 25311454].
 13. Terada T. Cutaneous pseudolymphoma: a case report with an immunohistochemical study. *Int J Clin Exp Pathol.* 2013;6(5): 966-72. [PMID: 23638232].
 14. Charli-Joseph YV, Gatica-Torres M, Pincus LB. Approach to cutaneous lymphoid infiltrates: When to consider lymphoma? *Indian J Dermatol.* 2016;61(4): 351-74. [PMID: 27512181].