



Contents lists available at ScienceDirect

Journal of Hand Surgery Global Online

journal homepage: www.JHSGO.org

Case Report

Post-Traumatic Chylous Wrist Effusion: A Case Report

Je-Chan Lee, MD, * Sang Ki Lee, MD *

* Department of Orthopedic Surgery, Eulji University College of Medicine, Daejeon, Korea



ARTICLE INFO

Article history:

Received for publication February 25, 2024

Accepted in revised form February 27, 2024

Available online March 22, 2024

Key words:

Chylous effusion

Post-traumatic

Wrist

Chylous joint effusion is a rare condition characterized by the presence of a milky, viscous synovial fluid with abnormal lipid concentrations. The thorax is the most common site of involvement. Only a handful of cases have been reported in the field of orthopedic surgery and even fewer have been reported involving uncommon locations such as the knee. Treatment of chylous joint effusion may require surgical intervention along with the use of somatostatin or octreotide and a low-fat diet. We present herein a case of post-traumatic chylous effusion in the wrist treated with surgical incision and drainage, octreotide, and a low-fat diet. There have been few reports of chylous effusion in the knee; however, to our knowledge, this is the first report of post-traumatic chylous effusion in the wrist.

Copyright © 2024, THE AUTHORS. Published by Elsevier Inc. on behalf of The American Society for Surgery of the Hand. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Chylous joint effusion is a rare condition marked by the presence of milky viscous synovial fluid that contains abnormal lipid concentrations.¹ Only a handful of cases have been reported, mostly in the field of thoracic surgery. Whether the cause is malignancy or iatrogenic, injury to the thoracic duct may lead to chylothorax, a condition involving chylous leakage into the thorax. As more cases are reported, the treatment and diagnostic process for chylous leakage follow those for chylothorax.

A chylous effusion typically contains a high concentration of triglycerides (>110 mg/dL), and the cholesterol level is generally <200 mg/dL in an aspirated fluid analysis.² Although a cutoff value of 110 mg/dL is typically used, triglyceride levels should be interpreted in the clinical context along with imaging studies and laboratory results to exclude other diagnoses.

Medical management of chyle leak is based on the theory that a decrease in chyle flow will allow for spontaneous closure of the source.³ Treatment includes adequate drainage and maintenance of a “fat-free” or low-fat diet.³ Much consideration is also being given to use of octreotide, a synthetic somatostatin analog, in the treatment of chyle leak.³ The mechanism by which octreotide decreases chyle leak is theorized to be a decrease in absorption of triglycerides, which leads to a decrease in lymphatic flow.³ Octreotide also decreases the fluid volume by inhibiting gastric, pancreatic,

and biliary secretions and the absorption of chyle from the intestine.^{4,5}

To date, only a limited number of chylous effusion cases have been reported in the field of orthopedic surgery, and most involve the knee or ankle joints. To our knowledge, this is the first report of chylous effusion in the wrist with clinical evidence suggesting a trauma-related etiology. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Case Report

A 55-year-old woman was admitted to our hospital through the outpatient department with the chief complaint of left wrist pain and a concomitant mass-like lesion on the volar side of the wrist. The mass-like lesion was round and fixed, showed no tenderness, and seemed fluid-filled.

The patient had a history of two surgeries on the left wrist. An ulnar shortening osteotomy was performed for the treatment of suspected ulnar impaction syndrome (Fig. 1). Approximately 2 years later, the implant placed during the previous surgery was removed (Fig. 2). The patient complained of persistent pain after the second surgical procedure. Follow-up radiography showed nonspecific findings; nonsteroidal anti-inflammatory drugs were administered, but the pain did not subside. According to the patient, the mass was first observed during her 4-month post-operative follow-up. Radiographic images showed progressive

Corresponding author: Sang Ki Lee, MD, Department of Orthopedic Surgery, 1306 Dunsan-dong, Seo-gu, Daejeon 35233, Korea.

E-mail address: sklee@eulji.ac.kr (S.K. Lee).

<https://doi.org/10.1016/j.jhsg.2024.02.008>

2589-5141/Copyright © 2024, THE AUTHORS. Published by Elsevier Inc. on behalf of The American Society for Surgery of the Hand. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



Figure 1. Radiographic image. Pre- and postoperative anteroposterior (AP) and lateral radiographic images of the left wrist. The patient underwent ulnar shortening osteotomy for the treatment of suspected ulnar impaction syndrome.

degenerative arthritic changes in her left wrist and a 0.5 cm mass-like lesion on the volar side (Fig. 3).

At the time of admission, radiographic imaging revealed severe arthritic changes and calcification throughout the left wrist joint and a prominent mass-like lesion on the volar side (Fig. 4). The size of the lesion had increased to approximately 4 cm in diameter. Mild erythematous changes and local heat were observed. The patient's complete blood count and C-reactive protein, serum uric acid, and amylase levels were within the normal limits, whereas triglyceride levels had increased to 271 mg/dL. Laboratory test results used to detect rheumatoid arthritis yielded negative results. To differentiate the patient's condition from crystalline arthropathies (ie, gout), a dual-energy

computed tomography scan was performed, showing no specific crystalline particles (Fig. 5). Magnetic resonance imaging showed increased joint effusion with low signal intensity changes in the distal radioulnar, radiocarpal, and ulnocarpal joints. Furthermore, peripheral dark and intermediate signal intensity, signal changes showing similarities to those of the joint effusion, and lesions abutting the radiocarpal joint with suspicious communication with the joint space were observed (Fig. 6).

Aspiration of the wrist was performed, yielding approximately 20 mL of a viscous, milky, yellowish fluid (Fig. 7). Examination of the synovial fluid showed no crystals. Gram staining of the synovial fluid was negative for bacteria, and bacterial cultures were



Figure 2. Radiographic image. Postoperative anteroposterior (AP) and lateral radiographs of the patient's left wrist. The patient underwent implant removal 16 months after ulnar shortening osteotomy.



Figure 3. Radiographic image. Four-month postoperative anteroposterior (AP) and lateral radiographs of the patient's left wrist. Diffuse calcification and arthritic changes are seen in the left wrist along with a mass-like lesion on the volar side.

negative. A lipid composition test of the synovial fluid yielded a triglyceride level of 208 mg/dL (>110 mg/dL) and a total cholesterol level of 176 mg/dL (<200 mg/dL).

Two days after the initial aspiration, the fluid-filled mass returned to its original size. To determine a definitive diagnosis, secondary surgical intervention was performed to drain the mass and obtain a biopsy. The joint space of the wrist was nearly filled with a distinctive yellow-white viscous fluid (Fig. 8). Microscopic pathological examination of the fluid revealed, clusters of multinucleated lymphocytes, histiocytes, and fat globules (Fig. 9).

Furthermore, two distinct areas of calcification were noted. These findings suggested chronic inflammation, whereas a high proportion of fat globules and lymphocytes was indicative of chylous effusion. Bacterial cultures and acid-fast staining yielded negative results. After assessing the data and clinical evidence, we diagnosed the condition as post-traumatic chylous wrist effusion. The patient was started on a low-fat diet and administered subcutaneous injection of octreotide (Sandostatin®, Novartis, Basel, Switzerland) every 2 weeks to inhibit fat absorption. The pain and swelling of the wrist disappeared within 2 weeks of the operation,

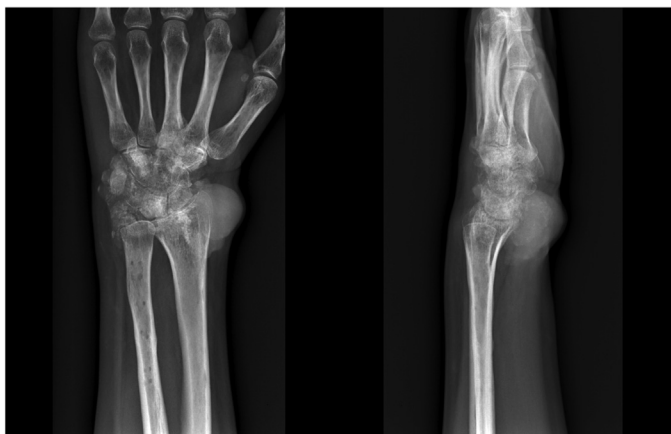


Figure 4. Radiographic image. Radiograph of the patient's left wrist at admission. The image shows severe calcification and destructive arthritic changes throughout the wrist joint and a large mass-like lesion on the volar side.



Figure 5. Computed tomography findings. Dual-energy computed tomography of the patient's left wrist shows no signal changes that would indicate crystalline arthritis.

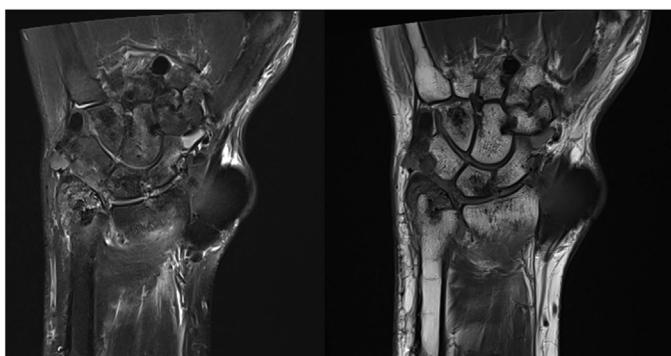


Figure 6. Magnetic resonance imaging findings. Magnetic resonance imaging of the left wrist shows increased joint effusion with low signal intensity changes in the distal radioulnar, radiocarpal, and ulnocarpal joints. In addition, a peripheral dark and intermediate signal intensity, signal changes showing similarities to those of the joint effusion, and lesions abutting the radiocarpal joint with suspicious communication with the joint space are observed on the volar side.

and no recurrences of effusion or pain have been reported (Fig. 10). Further long-term follow-up is planned to evaluate the patient's condition.



Figure 7. Intraoperative gross image. Intraoperative photo shows viscous milky fluid from the aspiration.

Discussion

The most common cause of chylous effusion is intraoperative injury to the thoracic duct. The milky joint fluid within a chylous joint effusion may result from a marked increase in the lipid content of the chyle. Other causes may include systemic lupus erythematosus with serum hyperlipidemia and rheumatoid arthritis.⁶ Trauma may also cause chylous joint effusions, but few such cases have been reported.^{7–9} Possible etiologies, including disruption of the synovium, subsynovial fat release, and intra-articular fat pad necrosis, have been hypothesized but not pathologically confirmed.¹ Post-traumatic chylous effusion symptoms and signs (eg, pain, swelling, and restricted range of motion) can mimic those of crystalline arthritis or other types of arthritis with discharge. Distinguishing these conditions remains a challenge. As all types of arthritis often lead to irreversible joint damage, an accurate diagnosis is critical. Thus, a dual-energy computed tomography scan and a biopsy of the specimen were performed to exclude the possibility of crystalline arthritis.

Inflammatory markers play an important role in establishing a chylous joint effusion diagnosis, and in the present case, the white blood cell count and C-reactive protein level were within the normal limits.

An accurate diagnosis of chylous joint effusion requires microscopic confirmation of triglyceride-rich joint fluid with abundant fat globules and inflammatory cells. Tissue cultures and histological and physical examinations may also help establish the diagnosis of chylous effusion, which is critical to avoid unnecessary antibiotic

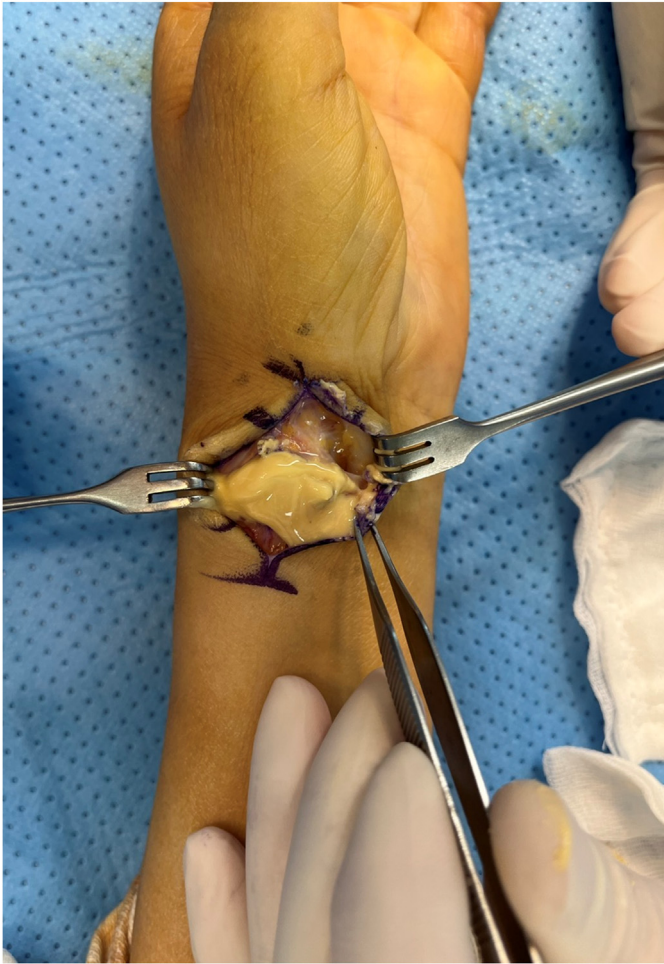


Figure 8. Intraoperative gross image. Intraoperative photo shows viscous milky fluid within the wrist joint.

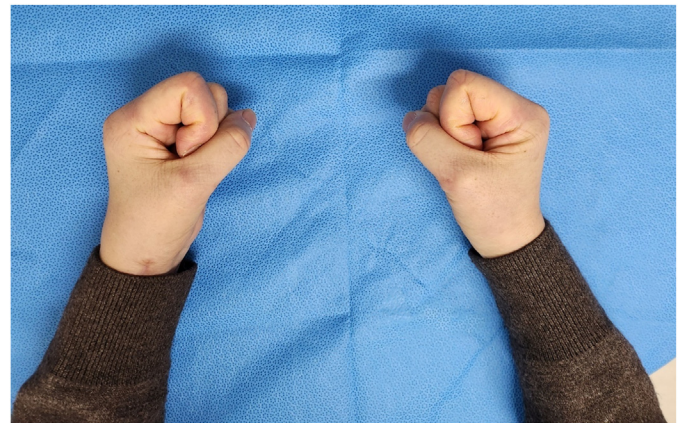


Figure 10. Gross image of the patient's wrist during follow-up. This image from the 1-year follow-up shows no recurrence of the mass-like lesion.

therapy and prevent substantial joint damage. In the present case, the presence of joint rich in triglycerides, negative culture results, and histological examinations led to the diagnosis of chylous effusion.

Chylous effusion itself was thought to be the cause of the patient's progressive joint damage, as adipose tissue can affect inflammatory and immune reactions.¹⁰

Furthermore, in the present case, magnetic resonance imaging of the left wrist showed areas of change in signal intensity along the bone marrow, and abnormal signal changes were observed on fat-suppressed T2-weighted images of the carpal joints.

Treatment included subcutaneous injection of octreotide, and lower levels of serum triglycerides were observed 2 weeks post-operatively. No recurrences of effusion or pain were observed at the 1-year postoperative follow-up.

In conclusion, we report a rare case of post-traumatic chylous effusion of the wrist. Surgical intervention may act as a trauma, triggering chylous effusion even in the wrist.

Conflicts of Interest

No benefits in any form have been received or will be received related directly to this article.

References

1. Tahara M, Katsumi A, Akazawa T, Otsuka Y, Kitahara S. Post-traumatic chylous knee effusion. *Knee*. 2011;18(2):133–135.
2. Maldonado F, Hawkins FJ, Daniels CE, Doerr CH, Decker PA, Ryu JH. Pleural fluid characteristics of chylothorax. *Mayo Clin Proc*. 2009;84(2):129–133.
3. Smoke A, DeLegge MH. Chyle leaks: consensus on management? *Nutr Clin Pract*. 2008;23(5):529–532.
4. Kalomenidis I. Octreotide and chylothorax. *Curr Opin Pulm Med*. 2006;12(4):264–267.
5. Al-Zubairi SA, Al-Jazairi AS. Octreotide as a therapeutic option for management of chylothorax. *Ann Pharmacother*. 2003;37(5):679–682.
6. Newcombe DS, Cohen AS. Chylous synovial effusion in rheumatoid arthritis. *Am J Med*. 1965;38(1):156–164.
7. Reginato AJ, Feldman E, Rabinowitz JL. Traumatic chylous knee effusion. *Ann Rheum Dis*. 1985;44(11):793–797.
8. White RE, Wise CM, Agudelo CA. Post-traumatic chylous joint effusion. *Arthritis Rheum*. 1985;28(11):1303–1306.
9. Soojian MG, Tejwani NC. Chylous knee effusion: Is it septic arthritis? A case report and review of literature. *J Trauma*. 2004;57(5):1121–1124.
10. Ioan-Facsinay A, Kloppenburg M. An emerging player in knee osteoarthritis: the infrapatellar fat pad. *Arthritis Res Ther*. 2013;15(6):225.

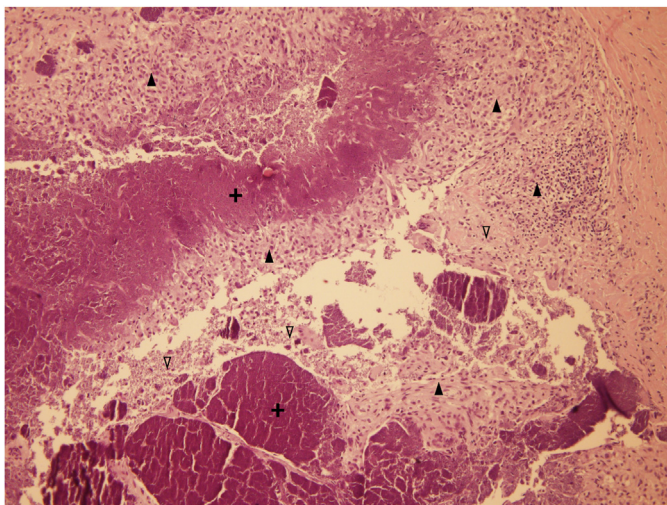


Figure 9. Pathologic examination (hematoxylin and eosin stain).
+ indicates calcification of the synovial fluid.
▲ indicates presence of histiocytes and multinucleated lymphocytes, suggesting inflammation.
▽ indicates fat globules, suggesting high concentration of lipids in the synovial fluid.