CASE REPORTS

Chylous joint effusion: A rare entity that mimics septic arthritis

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Abstract

Chylous joint effusions are infrequent conditions characterized by their macroscopic milky appearance. Their detection warrants a work-up to rule out an extensive list of triggers. Also to consider is that at onset they may mimic infectious arthritis. This report describes a young man complaining of post-trauma knee pain and swelling. Both the macroscopic aspect and the biochemical composition of the synovial fluid were consistent with a chylous effusion. It contained large amounts of neutral lipids, and mostly triglycerides. We could exclude infections, as well as other possible causes of the episode and concluded that it had been precipitated by joint injury. Trauma has been formerly identified as causative agent of chylous effusions in other four cases. We outline that the real challenge in these conditions is to make a correct diagnostic approach. Otherwise, they are self-limited and only symptomatic care is needed.

Keywords

Chylous effusion, Septic arthritis, Joint swelling, Post-traumatic arthritis

1 Introduction

Septic arthritis can lead to a rapid destruction of joints, which results in loss of function and other sequels. Its diagnosis is usually based on both clinical and laboratory findings. An empirical therapeutic approach is warranted in most cases, and surgical debridement is often required. Many conditions can mimic septic arthritis, including chylous effusions. Their clinical presentation can make distinguishing between both entities difficult. However, they are associated to almost opposite outcomes, and subsequently need a different therapeutic approach. In chylous effusions, the synovial fluid analysis draws a characteristic profile that helps rule out infectious arthritis. Nonetheless, there is a large list of potential causes of chylous effusions which need to be considered.

Based on a case description, we discuss the work up for the differential diagnosis of these atypical synovial effusions.

2 Case report

A 32-year-old black man attended in the emergency room because of pain in his right knee, with joint swelling and disability progressing during the last 10 days. He was original from Senegal and past medical history was non

contributory. 30 days prior to the current episode, the patient had suffered a high energy trauma. He had been hospitalized elsewhere, and diagnosed with ischiopubic branch and radial head fracture. Treatment had been conservative.

He denied fever, chills, recent high-risk sexual intercourse, as well as other relevant symptoms. The patient had an overall healthy appearance and had normal vitals. The internal compartment of his right knee was tender at palpation. Massive joint effusion was noticeable, and range of movement was limited to 90º of flexion with preserved full extension.

The joint was punctured and approximately 80cc of creamy orange fluid was aspirated (see Figure 1). Synovial fluid analysis revealed the following:

- Biochemical parameters. Amylase 44.00 UI/l, LDH 614.00 UI/l, Cholesterol 292.00 mg/dl, Triglycerides 570.00 mg/dl, Glucose 82.00 mg/dl, Total protein 5.60 g/dl, Albumin 3.10 g/dl.
- Cell count. 700 Leukocytes/mm^3 (90% mononuclear cells, 10% polymorphonuclear neutrophils), 3000 red cells/ mm^3.
- Microbiologic procedures. Gram stain did not show any micro organisms and cultures were negative.
- Smear. No crystals were observed with polarized light microscope.

Figure 1. Chylous effusion drained from the patient's right knee

Plain X-rays (antero-posterior and lateral views) of the right knee showed a large effusion but no fracture. Otherwise, ancillary data, including a complete blood cell count, pancreatic and hepatic enzymes were in normal values. C-reactve protein was slightly increased (0.9 mg/dl, N < 0.5). An MRI study showed bone oedema at the internal femoral condyle and internal tibial plateau indicating bone contusion. An abdominal ultrasound exam did not show hepatosplenomegaly or pancreatic abnormalities.

With these studies, an infectious origin as well as any other systemic condition could be ruled out as causative agents for the chylous effusion. The final diagnosis was trauma-associated chylous arthritis.

After 48 hours of treatment with NSAIDs and rest, the patient showed a favourable evolution, he was able to walk without difficulty and was discharged from hospital with a complete functional recovery.

3 Discussion

A synovial effusion is defined as chylous or chyliform when it contains a greater than 800 mg/100 ml lipid concentration. The creamy aspect results from intra-articular fat emulsification caused by lysosomal enzymes and other synovial proteins [1]. The leukocyte count at the synovial fluid is generally low, with a predominance of mononuclear cells.

A milky appearance of the synovial fluid suggests a septic origin in the first place. Indeed, the condition has been referred to as "pseudoseptic arthritis" [2]. However, once infection has been ruled out, there are many other potential etiologic factors that need to be considered. In particular, chylous effusions have been described in the context of systemic lupus, rheumatoid arthritis, filariasis and also in pancreatitis.

As regards rheumatoid arthritis, the effusion may arise as the result of chronic inflammation of the fat-rich elements of the joint, such as the synovial tissue, bursae and tendon sheats [3]. On the other hand, the cause of a chylous effusion in a patient with lupus was found to rely on the presence of combined hyperlipidaemia associated to nephrotic syndrome. Lipid analysis in the synovial fluid revealed abnormaly increased levels of cholesterol, phospholipids and chylomicrons.

Das, *et al*. [4] described chylous arthritis in 25 patients with chronic filariasis. The obstruction of lymphatic vessels leading to lymphangiectasia and aberrant channel ending in to the joint are suggested as principal mechanism for the accumulation of fat inside the swollen joints.

Also of note, patients with pancreatitis suffer an arthritic episode with a chylous effusion as an extra-pancreatic complication, in relationship with systemically activated fat digestion.

This syndrome is also called "PPP syndrome" [5] after pancreatitis, panniculitis and polyarthritis. Women and alcoholic patients appear to be especially susceptible, the prevalence is higher during acute pancreatitis and it usually involves more than one joint region at the lower limbs. Interestingly joint injury was found as triggering factor in up to one third of cases with pancreatic disease.

The first case of a trauma-related chylous arthritis was published back in 1985 [6]. Subsequent reports from then on are scant, probably because of its rarity [1, 2, 7].

Organic lipids can be grouped in three main categories: cholesterol, phospholipids and neutral lipids (most of the latter being triglycerides). Rabinowitz, *et al*. [8] showed the different amount of neutral lipids, mostly triglycerides, contained in bone marrow (96%), and different intra-knee joint sites, as the infrapatellar pad (98%) and the supraconylar pad (91%). The above-enlisted tissues were found to contain less than 7% phospholipids, while in contrast, the amount of phospholipids in joint cartilage, synovial fluid and ligaments is between 30% and 40%. The finding of small amounts of cholesterol and phospholipids in the synovial fluid is considered normal, while neutral lipids are usually not detected.

In the case of high energy trauma injuries, it has been hypothesized that synovial lining disruption with subsequent leaking of subsynovial content and fat necrosis are the principal source of lipid income to the joint cavity [1, 7, 9]. The synovial membrane is composed of a non-sealed lining layer of 1 to 4 cell rows in close contact with the subsynovial fat. Therefore, not only it is vulnerable to sheer forces and trauma, but its disruption also allows a direct influx of lipid-rich material to the cavity [1, 8].

Two types of trauma-related chylous effusions can be distinguished, as regards presence or absence of an associated fracture [10] (see Table 1). In the first case, highly increased levels of tryglicerides and to a lesser extent of phospholipids and cholesterol should be expected. In comparison, joint bruises without fracture show more modestly increased levels of both triglycerides and phospholipids. In the case of fractures involving subchondral bone, the bone marrow appears to be the major source of the lipid leakage to the joint. Thus, effusions show a majority of neutral lipids, consistent with the high

triglyceride concentration in yellow bone marrow [6, 10]. On the other hand, fat pads, ligaments and meniscal cartilage are probably the principal sources of lipids in the second type.

A correct clinical evaluation, together with a complete synovial fluid analysis, helps avoid a surgical intervention in trauma-associated chylous arthritis. It should be stressed that joint surgery does not generally add to diagnostic tools and might even worsen the condition. Although some cases were subjected to arthroscopic exam and lavage [2, 6], the wait-and-see strategy has also been found useful.

In our patient, medical history and complementary studies support a traumatic origin as the most likely cause of chylous effusion.

Table 1. Laboratory data in the previously reported cases of post-trauma chylous effusions

	Leukocytes (PMN/L)	Red Cells	Triglycerides	Cholesterol	Phospholipids	Amylase	Proteins	Glucose
Reginato, A. J, *et al*.	500/mm^3	Nd	1.022 mg/dl	139 mg/dl	24 mg/dl	Nd	Nd	Nd
White, R. E, *et al*.	1.800/mm^3 (18%/82%)	200/mm^3	11.700 mg/dl	370 mg/dl	< 1mg/dl	75 U/dl	Nd	72 mg/dl
Soojian, *et al*.	0	25/mm^3	155 mg/dl	Nd	Nd	1.8 U/dl	6.4 g/dl	25 mg/dl
Tahara, *et al*.	"few"	Nd	Nd	Nd	Nd	Nd	Nd	49 mg/dl
Borges, P. E, *et al*. (current report)	700/mm^3 (10%/90%)	3.000/mm^3	570 mg/dl	292 mg/dl	-	614 U/dl	5.6 g/dl	82 mg/dl

Note. PMN = polymorphonuclears; L = lymphocytes; Nd = no data.

4 Conclusion

Chylous effusion is an infrequent condition that often resembles septic arthritis. A positive history for recent injury together with a compatible composition of the synovial triglyceride levels supports trauma as the causative factor. It is a self-limited process and surgery operation is usually not required.

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