Fibrocollagenous mass formation in an osteoarthritic knee after viscosupplementation

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Hyaluronic acid injections are common non-operative treatment for osteoarthritic of the knee. Studies have shown that intra-articular injections of hyaluronic acid significantly improve pain and functional outcomes with few adverse events. Here, we report one case of fibrocollagenous mass formation after an intra-articular hyaluronic acid injection into the knee of a 63-year-old male patient who had pain and palpable mass on his left knee. Open excision of the soft mass yielded complete relief of symptoms. Histopathology revealed a well marginated mass with hypertrophic fibroblasts.

Keywords: Knee; Osteoarthritis; Hyaluronic acid; Injections; Fibrocollagenous mass

INTRODUCTION

Osteoarthritis of the knee is one of the most common joint disorders in the elderly. Mild-to-moderate osteoarthritis can be treated using conservative methods such as simple analgesics, non-steroidal anti-inflammatory drugs, intra-articular injections of glucocorticoids, and exercise [1]. Among them, intra-articular injections of hyaluronic acid have recently gained popularity as a non-operative option for osteoarthritis of the knee. Hyaluronic acid injections, that is, viscosupplementation, involve injecting exogenous high-molecular-weight hyaluronic acid into the knee to counteract prominent features of osteoarthritis—a decreased synovial elastoviscosity [2]. Some studies have reported that intra-articular injections of hyaluronic acid significantly improve pain and functional outcome and leads to fewer adverse events [3,4]. Further, because the operation is easy to perform, it is commonly administered at local clinics to patients with osteoarthritic knees. However, intra-articular hyaluronic acid injections are associated with some complications [5,6]. The two most common adverse reactions are mild pain and swelling at the site of the injection, occurring in up to 20% of patients. Severe or local inflammation, warmth, and joint effusion are rare, and no systemic complications have been reported in the literature as of yet. Here, we report a case of fibrocollagenous mass formation after an intra-articular hyaluronic acid injection in an osteoarthritic knee. To the best of our knowledge, we are the first to describe the histopathological findings of a fibrocollagenous mass that developed after hyaluronic acid supplementation in a patient with osteoarthritis of the knee.

CASE REPORT

A 63-year-old male patient was hospitalized at our institution for pain and a palpable mass on his left knee. Two months before the hospitalization, he had been given an intra-articular hyaluronic acid injection to both knees for osteoarthritis. He had complained of severe pain on his left knee during the injection. Approximately a month after the injection, he noticed a palpable and tender mass
on his left knee, which he claimed was where the injection had been given. Using physical examination, we detected a palpable soft mass of approximately 2 × 2 cm in size on the superiolateral aspect of the left knee. The mass was tender and movable, and its margins within the subcutaneous later were easily distinguishable.

Simple radiography showed an increased density of the affected area. However, there was no bony lesion except for the osteoarthritis. On the basis of these findings, we diagnosed a benign tumor on the left knee. We performed an open excision of the tumor with the patient under spinal anesthesia and in supine position. To uncover the mass, we made an incision into the superiolateral facet of the left knee, over the median line of the tumor, and meticulously dissected the subcutaneous tissue. The lesion was approximately 2 × 2 cm³ in size, well demarcated, and surrounded by a fine fibrous capsule. After excisional biopsy, our gross examination revealed a solid, grayish, and round mass (Fig. 1). Histopathological analysis again showed a well marginated mass, and H&E staining indicated the presence of hypertrophic fibroblasts (Fig. 2). At the 6-month follow-up, the patient was asymptomatic and fully engaged in activities.

**DISCUSSION**

Here, we describe a case of fibrocollagenous mass formation after an intra-articular hyaluronic injection. We predict that the mass was caused by inappropriate injection of the viscosupplementation agent.

Hyaluronic acid is a polysaccharide chain that consists of repeating disaccharide units, approximately 12,500 units, of N-acetylglucosamine and glucuronic acids. The polysaccharide has a molecular weight of 5 × 10⁶ daltons and is synthesized by type B synoviocytes or fibroblasts, which then secrete the polysaccharides into the joint space. The knee joint contains approximately 2 mL of synovial fluid with a concentration of 2.5 to 4.0 mg/mL hyaluronic acid.

Hyaluronic acid has both elastic and viscous properties [1]. The degree to which either predominates relies on

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**Fig. 1.** The gross shape of lesion was round and greyish mass.

**Fig. 2.** Histopathology shows well margined mass with hypertrophic fibroblast (arrows; H&E, ×40).
the amount of shear force. A high shear force leads to increased elasticity and decreased viscosity of hyaluronic acid and vice versa for a low shear force. These properties allow hyaluronic acid to act as a shock absorber during fast movements and as a lubricant during slow movements of the knee joint.

In an osteoarthritic knee, the concentration of hyaluronic acid reduces to one half to one third of its normal value [2], and its molecular size also decreases, leading to less interaction between hyaluronic acid molecules. This substantially lowers the dynamic interaction between the viscous and elastic properties of the synovial fluid and prevents the knee joint to function as a shock absorber. The loss in lubrication causes increased stress forces, disrupting the collagen bundle that is essential for the integrity of the articular surface.

Osteoarthritic joints produce a lower level of hyaluronic acid than normal joints. Viscosupplementation has been shown to benefit patients with osteoarthritis through its anti-inflammatory, anabolic, analgesic, and chondroprotective effects [3,4]. Hyaluronic acid has been shown to self-modulate its synthesis by regulating synovial fibroblasts activity. For instance, Smith and Ghosh [7] described how different preparations of hyaluronic acid injections differentially stimulated synovial fibroblasts activity and, thus, hyaluronic acid synthesis. In a rat model, Ghosh and colleagues [8,9] reported that the analgesic effect of intra-articular hyaluronic acid was comparable to that of indomethacin. Although the chondroprotective effect of hyaluronic acid has not yet been clinically proven, there are some animal studies in support of it: hyaluronic acid injections were shown to improve gait in osteoarthritis-induced sheep from the fifth week of therapy.

The overall incidence of adverse reactions after hyaluronate viscosupplementation is only 1% per injection, most of which were localized inflammations. However, Lussier et al. [5] observed a local reaction in only 2.7% of 1,537 injections (or 8.3% of 336 patients), 79% of which resolved without long-term sequelae. Marino et al. [6] reported a complication of granulomatous inflammation after hylan G-F20 viscosupplementation into the knee.

In this study, we found that it is important to accurately place intra-articular needles in knee joints during treatments such as viscosupplementation for osteoarthritis of the knee. A systematic review of different approaches to intra-articular needle placement in the knee joint revealed that the superiolateral approach resulted in the highest degree of accuracy, with a highest pooled accuracy of 91% [10]. Pooled accuracy rates for the lateral mid-patellar approach, the anterolateral approach, and the anteromedial approach were all lower than the superiolateral approach (85%, 67%, and 72%, respectively) [10]. On the basis of the location of the mass and the severe pain experienced by the patient during the injection, we suggest that the injection was inappropriately administered into the subcutaneous layer.

In conclusion, our case report demonstrates that in patients with an osteoarthritic knee hyaluronic acid injection, in particular the placement of the intra-articular needle, must be performed accurately and with caution to prevent complications.

**CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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