Annals of Clinical Case Reports

Case Report
Published: 02 Dec, 2016

Multi-Articular Septic Arthritis Following Intrarticular Adipocyte Injection: A Case Report

John F Fleming III and Ronald A Navarro*

Harbor-UCLA medical center, Department of Orthopaedic Surgery, USA

Abstract

Mesenchymal stem cell implantation is thought to have a role in the treatment of degenerative osteoarthritis, and is an area of active research. However, large scale human data in clinical trials is lacking, and no consensus currently exists as to the optimal harvesting, application, and adjunct techniques for the use of mesenchymal stem cells. This case study examines one patient who under the direction of a US physician-underwent the harvesting of adipose tissue and delayed injection into multiple sites, resulting in a protracted adverse outcome. The event brings to light clinical and ethical considerations concerning patient education of alternative therapies available in the community, and the role of emerging treatments in regenerative medicine.

Introduction

The use of mesenchymal stem cells (MSCs) for degenerative joint disease is an evolving treatment modality in orthopaedics, with rapidly expanding research into the biology and potential clinical applications of MSCs [1]. Although most research has focused on bone marrow derived MSCs [2], autologous harvesting of adipocytes has been proposed as a potential source of cells to be used in treatment. However, human clinical data for this source is largely lacking, and when present, often contradictory [3]. Unfortunately, the relative paucity of evidence has not hindered some physicians from engaging in the use of this unproven method on their patients. This case study explores one such example which resulted in an adverse clinical event.

Case Presentation

A 65 year old, non-diabetic, immunocompetent male presented to the emergency department with pain in his right knee, right elbow, and right lower back for one day. The patient reported that the pain had been continuous since receiving "multiple injections of stem cells" into the above sites. He reported that these cells had been previously harvested from his abdomen 6 days prior. The patient had seen a plastic surgeon in southern California who encouraged him to pursue a new form of treatment for his multi-articular arthritis, and to avoid orthopaedic surgical treatment. This surgeon extracted fat via liposuction from his abdomen, and gave the patient the cellular material in a test tube enclosed in a plastic bag.

The following day the patient took the cells to a lab in Southern California for processing; he was told this would convert the fat cells into stem cells. He was informed that from this point, the cells would be sent from the lab to a colleague of the primary surgeon, who practiced in Mexico. The patient crossed the US border after the initial procedure to a clinic in Mexico where another practitioner injected the patient's autogenously derived cells into his right elbow, right knee, right shoulder, and right lower lumbar region. The sites were prepared sterilely prior to injection. The patient complained of discomfort and redness several hours after the injection, but was told by his physician that this inflammation was typical, and should be expected for up to three days after such a procedure.

Upon returning to the US, that patient's right knee and elbow became increasingly painful over 24 hours, to the point he was unable to bear weight on his right leg. After presenting to the emergency department, the patient initially declined imaging as he was told that x-rays could interfere with the process of stem cell regeneration. He reluctantly agreed to x-rays as well as the aspiration of fluid from his knee, as he remained concerned of disrupting the process of the stem cells. On exam, the patient's right knee and elbow were erythematous and warm, with marked effusions and exquisite tenderness on attempted range of motion. NSAID therapy at home had failed to provide relief. He reported only mild pain in his right shoulder which had also received an injection of the material.

OPEN ACCESS

Correspondence:
John F Fleming III, Harbor-UCLA medical center, Department of Orthopaedic Surgery, USA, E-mail: jffleming@gmail.com

Received Date: *08 Oct 2016*
Accepted Date: *20 Nov 2016*
Published Date: *02 Dec 2016*

Citation:
John F Fleming III, Navarro RA. Multi-Articular Septic Arthritis Following Intrarticular Adipocyte Injection: A Case Report. Ann Clin Case Rep. 2016; 1: 1196.*

He was afebrile.

An initial synovial aspiration of the knee revealed 47,000 WBC/hpf with 97% neutrophils. Laboratory studies revealed an elevated serum white blood cell count to 12.8 x 10^9/L. Given the concerning physical exam and laboratory studies, the patient received an emergent arthroscopic debridement of his right knee and open irrigation and debridement of his right elbow. Arthroscopic exam of his right knee was indicative of gross purulence. Intraoperative cultures of both joints grew out pan-sensitive Stenotrophomonas Maltophilia. The patient underwent culture guided IV antibiotic therapy. After an initial resolution of symptoms, the patient experienced return of his right knee pain and elevation in inflammatory markers one month after his initial washout. Given his increased pain and laboratory findings, he was diagnosed with recrudescence of his septic joint and was taken back to the operating room for a repeat irrigation and debridement of his knee. Cultures again confirmed infection with S. Maltophilia. The patient was restarted on culture guided antibiotic therapy after this washout and experienced no further infection. At his one year follow-up appointment, the patient had returned to his baseline knee and elbow function with only mild pain reported.

Discussion

Mesenchymal stem cells (MSCs) are a group of non-hematopoietic stromal stem cells with the ability to differentiate into multiple cell lines including osteoblasts, adipocytes, fibroblasts and chondrocytes [4]. The use of such cells is a proposed treatment option for degenerative conditions, and is an increasingly popular target for basic science research in the last several years [5-10].

In orthopaedics, the majority of regenerative medicine research is based upon the ability of mesenchymal stem cells to ameliorate the destruction of cartilage from osteoarthritis that affects a large proportion of the population. There has been some promise from early clinical work on MSCs used for degenerative joint conditions. A recent level 1 multicenter study showed a statistically significant increase of meniscal volume in patients who received bone marrow derived MSCs via direct intra articular injection as compared those who received an inert vehicle [10]. However, the treatment effect was observed in only a minority of patients to whom it was administered, and there was a very large occurrence of adverse events [10], emphasizing the need for further research in this relatively new field.

Additionally, not all MSCs are equivalent. While the majority of clinical research has been based on bone marrow derived MSCs, Adipose derived mesenchymal stem cells (AD-MSCs) have been proposed as a possible source of regenerative material. The clinical advantage of this method lies in subcutaneous adipose tissue's abundance in superficial, accessible areas and the ease of harvesting it from subjects [5].

However, most evidence for AD-MSCs is based predominantly on animal data [3], and the majority of publications using AD-MSCs are based out of a single institution [5,9]. The human data that does exist is conflicting, with recent research demonstrating a decreased reservoir of stem cells within adipose tissue in elderly, obese, or diabetic patients [2,7,8]. It seems the injection of adipose derived cells into patients is premature based on current evidence.

Given the debilitating nature of osteoarthritis and limited treatment options, it is no surprise that patients would seek alternative therapies from practitioners promising a "quick fix".

This case is meant to illustrate the willingness of a single patient to accept a perceived new technology based on a physician's recommendation, and an adverse outcome that resulted. This specific case may not serve as a negative critique of the future use of AD-MSCs in the treatment of arthritis, as most proponents of the therapy would not advocate transporting cellular material across international borders as an accepted means of treatment. Even using proven treatment methods, the material handling practices utilized in this case would have had a very high likelihood of infectious complications.

However this instance brings to light a possible complication of one such treatment, and more importantly, illuminates the unsavory practices of some in the medical community willing to profit from substandard care. These events underline the need for orthopedic surgeons to be aware of alternative therapies offered in their community, in order to engage patients in a discussion of potential risks and benefits. This will allow physicians to be vigilant in their protection of patients against misinformation, and those who would facilitate unsatisfactory treatment.

References

1. Kolf CM, Cho E, Tuan RS. Mesenchymal stromal cells. Biology of adult mesenchymal stem cells: regulation of niche, self-renewal and differentiation. Arthritis Res Ther. 2007; 9: 204.
2. Choudhery MS, Badowski M, Muise A, Pierce J, Harris DT. Donor age negatively impacts adipose tissue-derived mesenchymal stem cell expansion and differentiation. J Transl Med. 2014; 12: 8.
3. Papadopoulou A, Yiangou M, Athanasiou E, Zogas N, Kaloyannidis P, Batsis I, et al. Mesenchymal stem cells are conditionally therapeutic in preclinical models of rheumatoid arthritis. Ann Rheum Dis. 2012; 71:1733-1740.
4. Wobus, Anna M, Boheler, Kenneth. Stem Cells. Handbook of experimental pharmacology. 2006; 249-82.
5. Koh Y, Choi YJ. Infrapatellar fat pad-derived mesenchymal stem cell therapy for knee osteoarthritis. The Knee. 2012; 19: 902-907.
6. Vilar J, Morales M, Santana A, Spinella G, Rubio M, Cuervo B, et al. Controlled, blinded force platform analysis of the effect of intraarticular injection of autologous adipose-derived mesenchymal stem cells associated to PRGF-Endoret in osteoarthritic dogs. BMC Vet Res. 2013; 9:131.
7. Blanca Oñate, Gemma Vilahur, Raquel Ferrer-Lorente, Juan Ybarra, Alberto Díez-Caballero, Carlos Ballesta-López, et al. The subcutaneous adipose tissue reservoir of functionally active stem cells is reduced in obese patients. Faseb j. 2012; 26: 4327-4336.
8. Cianfarani F, Toietta G, Di Rocco G, Cesareo E, Zambruno G, Odorisio T. Diabetes impairs adipose tissue–derived stem cell function and efficiency in promoting wound healing. Wound Rep Reg. 2013; 21: 545-553.
9. Koh Y, Jo SB, Kwon OR, Suh DS, Lee SW, Park SH, et al. Mesenchymal Stem Cell Injections Improve Symptoms of Knee Osteoarthritis. Arthroscopy: Arthroscopy. 2013; 29: 748-755.
10. Vangsness T, Farr J 2nd, Boyd J, Dellaero DT, Mills CR, LeRoux-Williams M. Adult Human Mesenchymal Stem Cells Delivered via Intra-Articular Injection to the Knee Following Partial Medial Meniscectomy. J Bone Joint Surg Am. 2014; 96: 90-98.