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Baghdad's first success in Bone Marrow Aspirate Concentrate procedure

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Abstract

Introduction-Bone Marrow Aspirate Concentrate procedure (BMAC) is a novel regenerative technique.

Aim-to show BMAC's success in relieving osteoarthritic knee sufferings in Iraqi patients.

Methods-It is a retrospective, descriptive investigation of 300 Iraqi patients who suffered from grades 1-3 Kellgren-Lawrence Grading for osteoarthritic knees, aged (35- 64) years, from both genders after oral consent at "Al Zahrawy Center for Stem Cells" in Baghdad over six months. The investigators utilize a verbal pain scale for pain evaluation.

Results-Of 300 patients, 195 (65 %) were women; the commoner patients had grade two. Sixty-four (21.3 %) patients discontinue their follow-up. Grade three patients manifest inadequate response. A single injection of BMAC had a good effect on pain score and night stiffness. There were 143 (47 %) patients still suffering in the sixth month, while 95 (31.6 %) patients required extra BMAC.

Conclusion-It is the first successful BMAC report in Iraqi patients for relieving osteoarthritic knee sufferings.

KEY WORDS

Osteoarthritis, Bone Marrow Aspirate Concentrate, Iraqi patients, Baghdad

Introduction

A Bone Marrow Aspirate Concentrate procedure (BMAC) is a well-known regenerative technique applied for medicine since the nineteenth century in its primitive forms and developed gradually with succeeded experiments. Accordingly, stem cells are aboriginal blood cells that produce different types of mature blood cells[1-2].

The BMAC procedure is a simple procedure that acts on different pathologies not healed by conventional methods or need major surgery like total knee replacement. Accordingly, in the BMAC procedure, the researcher injected the BMAC near the

damaged tissue to influence sequential pathophysiological cascades in the applied tissue.Subsequently,the BMAC demonstrated the ability to accommodate the challenging tissue micro environment for tissue regeneration [3-4].

The investigators tried various successful experiments of the BMAC procedure in animal and human experiments with good results [5].Moreover, the researchers clarified the flourishing applicability of the BMAC procedure in spinal disorders, and knee osteoarthritis [6-7].

Some Iraqi surgeons had performed stem cells trials (not BMAC) in Baghdad since 1998 despite many obstacles like laboratory tools. Consequently, those Iraqi researchers recorded their stem cells trials in famous journals [8].

The evolving BMAC results encourage us to apply BMAC for the first time in Baghdad in "Al Zahrawy Center for Stem Cells"

https://zahrawycenter.wixsite.com/zscstemcells, since December 2013 in high standard aseptic conditions with up-to-date laboratory tools plus well-trained medical staff [9-10].

In Erbil city, a center of BMAC procedure was established in 2018 by many specialized Jordanian and Iraqi surgeons (our center started in 2013). Hence, BMAC procedure is a growing-topic with high significance.To our knowledge,it is the first

study for the BMAC procedure in Iraq & Baghdad.The aim of our study was to show BMAC's success in relieving osteoarthritic knee sufferings in Iraqi patients.

Materials and methods

It is a retrospective, descriptive record of 300 Iraqi patients who suffered from grade 1-3 Kellgren-Lawrence osteoarthritic knees, aged (35- 64) years, from both sexes after oral consent at "Al Zahrawy Center for Stem Cells" in Baghdad over six months. The record from 1st January 2017 to 1st June 2017. A verbal pain scale ran for pain assessment. This record started as the patient visited "Al Zahrawy Center for Stem Cells" https://zahrawycenter.wixsite.com/zscstemcellsin Baghdad-Iraq. Before the BMAC procedure, the authors wrote the patient's data in a written and electronic recording system (detailed history, clinical examination, radiological grading, and laboratory tests).

BMAC procedure involved taking a tiny volume of the patient's bone marrow from the (ANTERIOR part of the pelvis) using local anesthesia as an outpatient technique. The surgeon sends this marrow to the lab in an aseptic technique to collect stem cells by AdiStem AdiLight-2 Photo Activation device for laboratory use www.adistem.comand preserve them, then reinserted into the patient's osteoarthritic knee for healing.

Subsequently, the surgeon gave the patient a non-steroidal anti-inflammatory drug for analgesia, plus advice to rest the knee for one week.

All patients were educated and trained on quadriceps exercises after BMAC injection. The surgeon advised the patients who did not benefit from the first BMAC injection to have a second injection after four weeks.

Patients were followed clinically for knee pain by a verbal pain scale, plus knee stiffness every three months for the initial six months, then every six months for the next two years.The authors concentrated in the first six months on more clear evidence and the main gathering of patients.The authors had Ethical approval.

In this record, the Kellgren-Lawrence radiological grading [11] include:

Grade 1: the patient had pain scale 4-5

Grade 2: the patient had pain scale 6-7

Grade 3: the patient had pain scale 8-9

Grade 4: the patient had pain scale 10

Inclusion criteria :

Three hundred Iraqi people suffered from Osteoarthritis 1-3 grades of Kellgren-Lawrence.

Exclusion criteria:

1.Diabetes Mellitus

2.Positive Hepatitis patients

3.Grade fourKellgren-Lawrence because they need knee replacement.

4.Sixty four patients lost to follow up

Limitations of Study:

1.Ninety five cases need BMAC reinjection

2.One female developed septic arthritis.

Results

Of three hundred patients,195 (65 %) were women; the commoner patients had grade two.Sixty-four (21.3 %) patients discontinue their follow-up. Grade three patients manifest inadequate response.A single injection of BMAC had a good effect on pain score and night stiffness.There were 143 (47 %) patients still suffering in the sixth month, while 95 (31.6 %) patients required extra BMAC.

Table 1.Gender distribution according to the grade at presentation

	Grade 1	Grade 2	Grade 3	Total
Male	29 (9.6%)	42 (14%)	34 (11.3%)	105 (35%)
Female	41 (13.7%)	105 (35%)	49 (16.3%)	195 (65%)
Total	70 (23.3%)	147 (49%)	83 (27.6%)	300 (100%)

Table 2. Gender distribution according to the grade in the first six months after BMAC

Sex	Grade 1	Grade 2	Grade 3	Total
Male	25 (10.5%)	33 (13.9%)	29 (12.1%)	87 (36.8%)
Female	26 (11.1%)	106 (44.9%)	17 (7.2%)	149 (63.2%)
Total	51 (21.6%)	139 (58.8%)	46 (19.4%)	236 (100%)

Table 3. Gender distribution according to the grade for those who require single BMAC

Sex	Grade 1	Grade 2	Grade 3	Total
Male	13 (9%)	27 (18.9%)	16 (11.2%)	56 (39.1%)
Female	21 (14.7%)	63 (44%)	3 (2%)	87 (60.9%)
Total	34 (23.7%)	90 (62.9%)	19 (13.2%)	143 (100%)

Discussion

This investigation shows how BMAC's success in reducing osteoarthritic knee sufferings in Iraqi patients. This paper included 300 Iraqi patients suffering from grades 1-3 Kellgren-Lawrence Radiological Grading osteoarthritic knees, aged (35- 64) years, from both sexes after oral consent at Al Zahrawy Center in Baghdad over six months. The authors assessed pain level through a simplistic verbal pain scale.Table 1 shows good sample size leads to notable results and a tenable conclusion.

It is a retrospective research, including its expected bias. Furthermore, it is the first report and successful report of the BMAC procedure in Iraq, according to our search in Google Scholar, PubMed, and Iraqi academic scientific journals.Women were the predominant sufferers that might designate the consequence of hard work or an outcome of multiple gestations. Accordingly, in Iraqi female life, this is a logical explanation of healthy productivity [12-13].

The commoner group is grade two from the four radiological grades of Kellgren- Lawrence of osteoarthritic knees, which is a reasonable justification of the need for hope for osteoarthritic healing in these patients. Hence, patients who had grade three or four had little benefit from the surgical or the conventional treatment like the Non-Steroidal Anti-Inflammatory Drugs plus the general advice[14-15].

Table 2 displays sixty-four patients (0.7 %) who was discontinuing their follow-up. There are many causes of this discontinuation include the loss of interest,the inadequate satisfaction of BMAC,the far home, and the high costs [16].

Table 3,showing grade three and four patients respond poorly. Accordingly, these grades indicate the severity of osteoarthritis (osteophytes and severe cartilage degeneration) that require total knee replacement. Subsequently, these cases did not benefit from single BMAC injections, so they may need two-three injections to enhance cartilage healing and alleviate their pain [16-17].Thus, the hindrance of the BMAC procedure can be because of the insufficient red blood cells in the sample, the quantity of BMAC, or the way of aspiration [18].The poor response of grade three to the BMAC made in trouble. Further,authors endeavor new solutions to achieve the best outcomes for grade three. Subsequently, we tried different doses and extra techniques over five years (2010-2016) to avoid failures and improve the BMAC's outcomes.

A single BMAC has been given to 143 sufferers in the sixth month, which is a real advancement against knee osteoarthritis to achieve a drop in knee pain, plus a single BMAC injection which is a good result.Accordingly, many earlier worldwide experiments that approved BMAC procedures and followed up their patients for two years included lower than 150 patients in their studies.Moreover, in each of these studies, there were many cases unsatisfied on BMAC [8].

Diabetic patients were excluded from BMAC injection due to low immunity and higher susceptibility to infection, as in the female who developed septic knee complications in this study. Further, this patient experienced steady rising knee pain after BMAC injection, so she backtracked on her third day. Furthermore, this patient was assumed as a case of the septic knee, so we started vigorous knee treatments by proper antibiotics,plus a knee brace till her symptoms went [19].

The BMAC was re-injected in ninety-five patients in grade three or four Kellgren-Lawrence grades. Accordingly, this corresponds thoroughly to the austerity of cartilage degeneration and the presence of osteophytes [20-21].BMAC contains undifferentiated stem cells that are much more potent than autologous platelet-rich plasma (PRP) that contains only growth factors[22-23]. Subsequently, this significant difference makes (BMAC) more effective in cartilage regeneration and symptomatic relief [24].

Authors choose the BMAC procedure other than replicating preceding Iraqi papers.Therefore,the BMAC succeeds in relieving our patients suffering,evident in their facial expressions and gratitude emotions, plus acknowledgment. We hope to help our patients and expand BMAC benefits with more clinical applications in other joints and different disease.

Conclusion

Our findings are the first successful report of BMAC in Baghdad city. Indeed,the Bone Marrow Aspirate Concentrate procedure contributed to relieve osteoarthritic knee sufferings in Iraqi patients,with a high response rate.

Conflict of interest

Authors have no conflict of interest.

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