Evaluation of the Analgesic Effect of Four Intra-Articular Ozone Injections in Knee Osteoarthritis

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ABSTRACT:

BACKGROUND:

Knee osteoarthritis (OA) is a degenerative disease of the knee joint. There is no cure for the disease, but some treatments attempt to slow disease progress

Intraarticular ozone injection is increasingly being applied. In knee osteoarthritis it represents a complementary treatment method which provides pain relief, decongestion, subsidence of bruises (hematomas), a reduction in temperature and an improvement in motility.

OBJECTIVE:

To evaluate the analgesic effect of 4 subsequent intra-articular ozone-oxygen injections in knee joint osteoarthritis.

PATIENTS AND METHODS:

It was a prospective, randomized clinical study, done on 30 knee joints, all patient were with history of OA of knee joint & suffering from long standing pain & they have long history of medical therapy. After taking patient consent, 5 weekly sessions of intra-articular 5 ml (25 µg/ml) ozone injections were done under complete aseptic technique. Numerical Analog Pain score has been assessed and recorded before each session.

RESULTS:

It was found that there was highly significant difference between each 2 subsequent sessions and the p-value was below 0.01 in all times.

CONCLUSION:

Subsequent Intra-articular ozone injection had significant analgesic effect in knee joint osteoarthritis

KEY WORDS: intraarticular ozone, knee joint osteoarthritis, chronic pain.

INTRODUCTION:

Pain is unpleasant sensory & emotional experience associated with actual or potential tissue damage or described in terms of such damage.(1)

Chronic pain was defined as pain that had been present for more than 6 months. It was thought that although many pains became persistent and chronic at 3 months, a 6-month division did not present difficulties in practice and was fairly characteristic.(2)

Osteoarthritis (OA) is a joint disease that most often affects middle-age to elderly people. It is a disease of the entire joint, involving the cartilage, joint lining, ligaments, and bone. Also known as degenerative arthritis or degenerative joint disease, is a group of mechanical abnormalities involving degradation of joints. Symptoms may include joint pain, tenderness, stiffness, locking, and sometimes swelling due to an effusion. A variety of causes—hereditary, developmental, metabolic, and mechanical—may initiate processes leading to loss of cartilage. When bone surfaces become less well protected by cartilage, bone may be exposed and damaged. As a result of decreased movement secondary to pain, regional muscles may atrophy, and ligaments may become more lax. (3)

OA is a top cause of disability in older people. The goal of treatment in OA is to reduce pain and improve function. There is no cure for the disease, but some treatments attempt to slow disease progress. Lifestyle modification (such as weight loss and exercise) and analgesics are the mainstay of treatment. Acetaminophen / paracetamol is used as first line treatment and non steroidal anti-inflamatory drugs (NSAIDs) can be added. (4) Injection of glucocorticoids (such as hydrocortisone) leads to short term pain relief. (5) Controversy surrounds the use of glucosamine in the management.(6) If pain becomes debilitating, joint replacement surgery may be used to improve the quality of life.(3)

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The ozone gas has been widely used in the last decades to treat several pathologies in conjunction with oxygen.[7] one of the clinical application is intra-articular ozone injection e.g. Knee OA. It represents a complementary treatment method which provides rapid pain relief, decongestion, subsidence of bruises (hematomas), a reduction in temperature and an improvement in motility.[8] The analgesic mechanism induced by O_2/O_3 may involve 2 independent steps: a short-term mechanism that may correspond with the direct oxidation on biomolecules, and a long-term mechanism that may involve the activation of antioxidant pathways.[9] Its strong oxidation is known to use one of the strongest oxidants and has a strong anti-inflammatory and analgesic effects present in the study of ozone treatment of knee. The relevant section of the mechanism in arthritis are: (1 inhibition of bradykinin release and inhibit the synthesis of inflammatory mediators PGs which lead to pain reduction (2 anti-inflammatory and inhibit the immune response (3 act directly on nerve endings and stimulate the middle of the inhibitory neurons release of cerebral knee skin and other substances, to achieve analgesic effect (4 to change the internal environment of the joint cavity, so as to promote repair and regeneration of articular cartilage, and slow down joint recession velocity [10]

This study is to evaluate the analgesic effect of 4 subsequent intra-articular ozone-oxygen injections of knee joint osteoarthritis.

PATIENTS AND METHODS:

It was a prospective, randomized clinical study, conducted in the pain clinic of the Nursing Home Hospital/ Medical City Complex/ Baghdad-Iraq, from October 2012 to February 2013. It involved 30 knee joints, all patient were with history of OA of knee joint & suffering from long standing pain & they have long history of medical therapy. Patient consent were taken from all patients. Carful & detailed history has been taken, regarding the pain (site, type, time, radiation, frequency, duration, severity), clinical examination was performed, and X ray was taken to confirm the diagnosis of knee OA.

Any patient had been treated by simple analgesic medications, treated with intra-articular injection of another medication in the last six months, or with uncontrolled diabetes mellitus were excluded from the study .

Under complete aseptic technique intraarticular injections, via either anterolateral or anteromedial approaches were done. Intraarticular local anesthetic (2 ml of 2% lidocaine) was given prior to ozone injection to minimize the burning sensation may be caused by the ozone. 5 ml of 25 µg/ml concentration ozone/O2 mixture was injected. The injection repeated for 4 sessions, 1 week apart.

Numerical Analog Pain score from 0 to 10 had been used to assess pain before each session. 0 would mean 'No pain' and 10 would mean 'Worst possible pain'. (Figure 1)

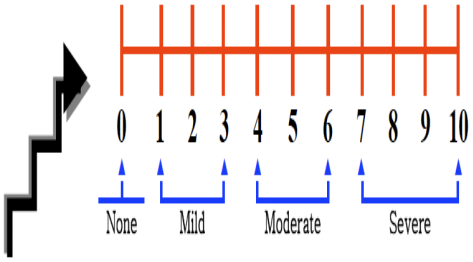

Fig. 1:The Numerical Analog Pain Score System.

The data were statically analyzed using the IBM SPSS Statistics 20 by the paired group student T-test & regarded as significant when the P value is less than (0.05) and highly significant when the P-value is less than 0.01

RESULTS:

It was found that there is highly significant difference of pain severity between visits of the patients and the p-value was below 0.01 in comparison between each consequent 2 visits as shown in figure 2 and tables (1-4)

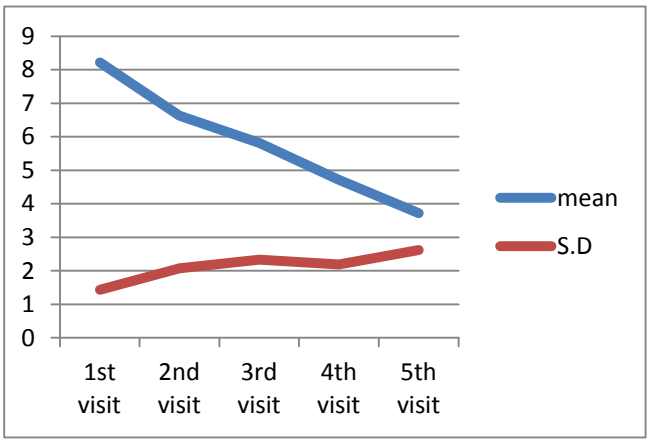

Figure 2: Mean of the Pain score and Standard deviation in the total 5 visits.

Table 1: Comparison of the 1st visit and the 2nd visit pain score.

	No. of cases	Mean	Standard deviation	P-Value
1st visit	30	8.2188	1.43087	0.0002
2nd visit	30	6.6250	2.07520	

Table 2: Comparison of the 2nd and 3rd visit.

	No. of cases	Mean	Standard deviation	P-Value
2nd visit	30	6.6250	2.07520	0.0001
3rd visit	30	5.8125	2.33401	

Table 3: Comparison of the 3rd and 4th visit.

	No. of cases	Mean	Standard deviation	P-Value
3nd visit	30	5.8125	2.33401	0.0004
4th visit	30	4.7188	2.18845	

Table 4:Comparison of the 4th and 5th visit.

	No. of cases	Mean	Standard deviation	P-Value
4th visit	30	4.7188	2.18845	0.0002
5th visit	30	3.7188	2.61798	

DISCUSSION:

Analysis of the result findings in this study on overall patient response to intra-articular injection of medical ozone showed there is a progressive reduction in pain intensity which was assessed by the numerical analog pain score from the 1st visit to the 5th.

Ahmed Al-Jaziri et al, studied painkilling effect of ozone-oxygen injection on spine and joint osteoarthritis of 220 patients with documented spine or extremities osteoarthritis. There were 114 knee joint of 72 patients having radiologically documented mild to moderate knee joint osteoarthritis. The patients' pains were recorded before intervention and at 4th, 8th and 12th sessions of treatment. The involved knee joints were injected by intra-articular ozone-oxygen mixture, 20 mcg/ml, twice a week for12 sessions They were followed for a mean of 8.48

months. Comparison of the patients' 1st day pains with their pains at 4th, 8th and 12th sessions showed a significant decrease (1st day to 4th session p=0.005, 1st day to 8th week p=0.005, 1st day to 12th session P<0.005). Comparison of the 1st day pain with the final follow-up pain, which was mean of 8.48 months from the first treatment, showed a meaningful decrease of pain. They concluded that due to the long-term effect of ozone-oxygen injection on pain relief of knee joint osteoarthritis, some histological changes seem to be involved in its mechanism of action.[11]

Carlos Huanqui et al, also studied the intraarticularozone therapy in patient with knee osteoarthritis resistant to anti-inflammatory treatment on 180 patients with diagnosis of primary knee osteoarthritis grade III were evaluated, all of them with poor clinical answer to non-steroidal anti-inflammatory drugs. 5 injections (2 weekly) : first 2 applications of 5 cc at concentration of 15 µg/ml and other 3 with 20 µg/ml. There was a progressive and significant lowering of global scores at 7, 14 and 28 days of evaluation with the ozone intra-articular application. At the end of treatment, the proportional improvement in the three clinical parameters evaluated was 52 %. Adverse effects were minimal, concomitant administration of NSAIDs was importantly reduced. They concluded that intra-articular ozone is an effective therapy in the treatment of grade III knee osteoarthritis resistant to treatment with NSAIDs.[12]

Both studies agree with the results of this study in that ozone has a significant progressive pain killing effect when given in subsequent intra-articular injections in patients known to have knee joint osteoarthritis.

CONCLUSION:

Four weekly subsequent Intra-articular injections of 5 ml ozone in a dose of 25 µg /ml has significant analgesic effect in knee joint osteoarthritis.

Further studies for intraarticular ozone injection for more number of cases, longer duration of follow up, the use of different concentrations, & comparing the effect with other types of treatment also recommended.

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