FANTASTIC FINDINGS

A Retrospective Study on Hackett-Hemwall Dextrose Prolotherapy for Chronic Hip Pain

at an Outpatient Charity Clinic in Rural Illinois

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ABSTRACT

Objective: *To investigate the outcomes of patients undergoing Hackett-Hemwall dextrose Prolotherapy treatment for chronic hip pain.*

Design: *Sixty-one patients, representing 94 hips who had been in pain an average of 63 months, were treated quarterly with Hackett-Hemwall dextrose Prolotherapy. This included a subset of 20 patients who were told by their medical doctor(s) that there were no other treatment options for their pain and a subset of eight patients who were told by their doctor(s) that surgery was their only option. Patients were contacted an average of 19 months following their last Prolotherapy session and asked questions regarding their levels of pain, physical and psychological symptoms and activities of daily living, before and after their last Prolotherapy treatment.*

Results: *In these 94 hips, pain levels decreased from 7.0 to 2.4 after Prolotherapy; 89% experienced more than 50% of pain relief with Prolotherapy; more than 84% showed improvements in walking and exercise ability, anxiety, depression and overall disability; 54% were able to completely stop taking pain medications. The decrease in pain reached statistical significance at the p<.0001 for the 94 hips, including the subset of patients who were told there was no other treatment options for their pain and those who were told surgery was their only treatment option.*

Conclusion: *In this retrospective study on the use of Hackett-Hemwall dextrose Prolotherapy, patients who presented with over five years of unresolved hip pain were shown to improve their pain, stiffness, range of motion, and quality of life measures even 19 months subsequent to their last Prolotherapy session. This pilot study shows that Prolotherapy is a treatment that should be considered and further studied for people suffering with unresolved hip pain.*

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KEYWORDS: alternative to hip surgery, hip pain, ligament injury, Prolotherapy, retrospective study.

INTRODUCTION

Chronic hip pain is a common condition resulting in over 383,000 hip replacements annually in the United States and the number is increasing every year.[1] The high rates of wear and tear, attributable to normal use of the hip, can result in long term problems. This makes sense when one considers that patients move their hips at least one million times per year during activities of daily living.[2,3] Population-based surveys of patients who have arthritis of the hip document a large untapped need for these procedures, suggesting that the rates of total hip arthroplasty will likely increase in the future.[4] Not everyone who is a candidate for a new hip will choose this option, as the operation has inherent risks including poor outcome, osteolysis and need for revision, deep vein thrombosis and limited life span.[5,6] Because of the limited response of chronic hip pain to other traditional therapies, many people are turning to alternative therapies, including Prolotherapy, for pain control.[7,8]

Prolotherapy is becoming a widespread form of pain management in both complementary and allopathic medicine.[9] Its primary use is in the pain management associated with tendinopathies and ligament sprains in peripheral joints.[10-12] It is also being used in the treatment of spine and joint degenerative arthritis.[13,14] Prolotherapy has long been used for chronic low back pain arising from the sacroiliac joints and as an alternative to surgery.[15-19] Prolotherapy has been shown in low back studies to

improve pain levels and range of motion.[20,21] In double-blinded human studies the evidence on the effectiveness of Prolotherapy has been considered promising but mixed.[22-25]

George S. Hackett, MD, coined the term Prolotherapy.[26] As he described it, "The treatment consists of the injection of a solution within the relaxed ligament and tendon which will stimulate the production of new fibrous tissue and bone cells that will strengthen the 'weld' of fibrous tissue and bone to stabilize the articulation and permanently eliminate the disability."[27] Animal studies have shown that Prolotherapy induces the production of new collagen by stimulating the normal inflammatory reaction.[28,29] In addition, animal studies have shown improvements in ligament and tendon diameter and strength.[30,31] While Prolotherapy has been used for chronic hip pain, no study has been published to date to show its effectiveness for this condition.[32] To evaluate the effectiveness of Hackett-Hemwall dextrose Prolotherapy, not just on hip pain but on quality of life measures, as well as its ability to reduce or eliminate the need or other medical therapies including total hip replacement this observational study was undertaken.

Patients and Methods

FRAMEWORK AND SETTING

In October 1994, the primary authors started a Christian charity medical clinic called Beulah Land Natural Medicine Clinic in an impoverished area in southern Illinois. The primary treatment modality offered was Hackett-Hemwall dextrose Prolotherapy for pain control. Dextrose was selected as the main ingredient in the Prolotherapy solution because it is the most common proliferant used in Prolotherapy, is readily available, is inexpensive compared to other proliferants, and has a high safety profile. The clinic met every three months until July 2005. All treatments were given free of charge.

PATIENT CRITERIA

General inclusion criterion were an age of at least 18 years, having an unresolved hip pain condition greater than six months that typically responds to Prolotherapy, and a willingness to undergo at least four Prolotherapy sessions, unless the pain remitted with less number of Prolotherapy sessions.

INTERVENTIONS

The Hackett-Hemwall technique of dextrose Prolotherapy was used. Each patient received 40 to 60 injections of a 15% dextrose, 0.2% lidocaine solution with a total of 50 to 60cc of solution used per hip. Each patient was given an intraarticular injection of 5 to 10cc of solution via the lateral or posterior approach. Injections were given at the bony attachments of the following structures around the hips including: the greater trochanter, intertrochanteric crest, neck of femur and dorsal ilium; ischiofemoral and ilofemoral ligaments; tensor fasica lata; and gluteus medius, pyriformis, gemellus superior, quadrates femoris, obturator internus, gemellus inferior and vastus lateral muscles. These typical tender spots each injected with 0.5 to 1cc of solution, can be seen in *Figure 1*. No other therapies were used. As much as the pain would allow, the patients were asked to reduce or stop other pain medications and therapies they were using.

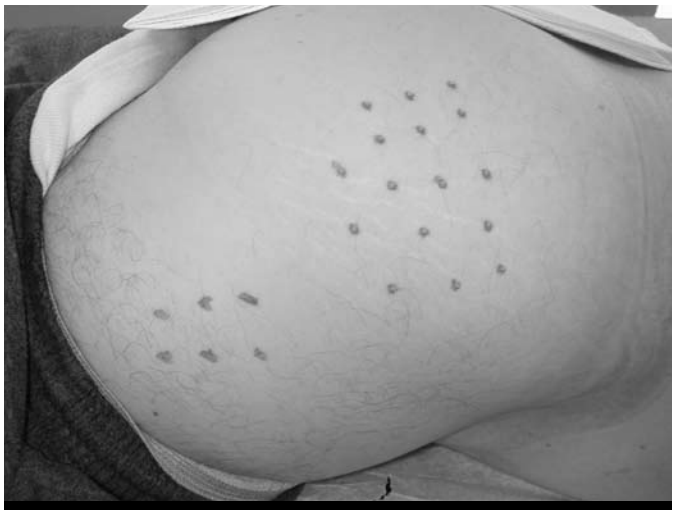


Figure 1. Typical injection sites for Hackett-Hemwall dextrose Prolotherapy of the hip.

DATA COLLECTION

Patients who received Prolotherapy for their chronic hip pain in the years 2001 to 2005 were called by telephone and interviewed by an independent data collector (D.P.) who had no prior knowledge of Prolotherapy. D.P. was the sole person obtaining the patient information during the telephone interviews. The patients were asked a series of detailed questions about their pain and previous treatments before starting Prolotherapy. Their response to Prolotherapy treatments was also documented in detail with an emphasis on the effect the treatments had on their

need for subsequent pain treatments and their quality of life. Specifically, patients were asked questions concerning years of pain, pain intensity, overall disability, number of physicians seen, medications taken, stiffness, walking and exercise ability, activities of daily living, quality of life concerns, psychological factors and whether the response to Prolotherapy continued after their last Prolotherapy session.

STATISTICAL ANALYSIS

For the analysis, patient percentages of the various responses were calculated using Microsoft Excel by an independent computer consultant (D.G.), who also had no previous knowledge of Prolotherapy. These responses, gathered from patients before Prolotherapy, were then compared with the responses to the same questions after Prolotherapy. The patient percentages were also calculated for patients who answered yes to either of the following two questions: *Before starting Prolotherapy it was the consensus of my medical doctor(s) that there were no other treatment options that he or she knew of to get rid of my chronic pain?* and *Before starting Prolotherapy my only other treatment option was surgery.* A matched sample paired t-test was used to determine if there were statistically significant improvements in the before and after Prolotherapy measurements for pain, stiffness, and range of motion in the above three groups (total hips and two subgroups above).

PATIENT CHARACTERISTICS

Complete data was obtained on 61 patients representing 94 hips. Of the 61 patients, 72% (44) were female and 28% (17) were male. The average age of the patients was 62 years-old. Patients reported an average of five years, three months of pain. Fifty-four percent had pain longer than four years and 39% had pain longer than six years. The average patient saw three doctors before receiving Prolotherapy. Twelve percent saw six or more doctors and another 22% saw four or five doctors for their chronic hip pain. The average patient was taking 1.1 pain medications. Thirteen percent stated that the consensus of their doctor(s) was that surgery was the only answer to their pain problem, and 33% of patients were told by their doctor(s) that there were no other treatment options for their chronic pain. (*See Table 1.*)

TREATMENT OUTCOMES

Patients received an average of 4.7 Prolotherapy treatments per hip. The average time of follow-up after their last Prolotherapy session was 19 months.

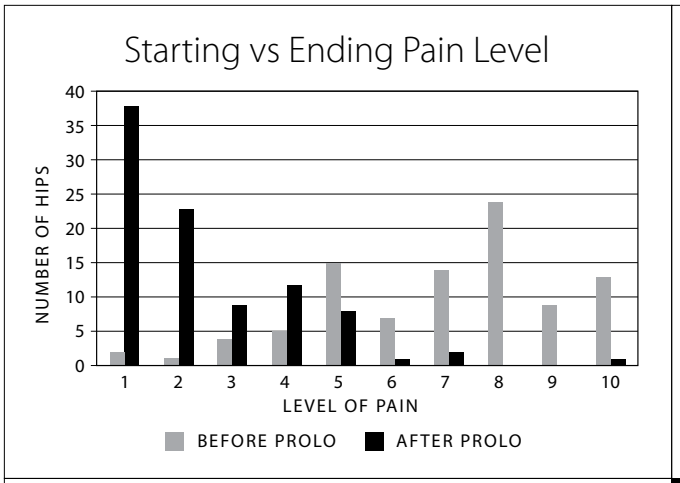
Table 1. Patient characteristics at baseline.

Total number of patients treated	61
Total number of hips treated	94
Average age of patients	62
Percent of male patients	28%
Percent of female patients	72%
Number of prior physicians seen	3.1
Average years of pain	5.3
Informed surgery only treatment option	13%
Informed no other treatment option for their chronic hip pain	33%
Average number of pharmaceutical drugs taken for pain	1.1

Pain, Crunching Sensation, Stiffness. Patients were asked to rate their pain, crunching sensation and stiffness on a scale of 1 to 10 with 1 being no pain/crunching/stiffness and 10 being severe crippling pain/crunching/stiffness. The 61, representing 94 hips had an average starting pain level of 7.0, crunching sensation of 2.0 and stiffness of 4.4. Their average ending pain, crunching and stiffness levels were 2.4, 1.2, and 2.0 respectively. Fifty-four percent had a starting pain level of eight or greater, while only 5% had a starting pain level of three or less, whereas after Prolotherapy only 2% had a pain level of eight or greater while 77% had a pain level of three or less. (*See Figure 2.*)

Range of Motion. Patients were asked to rate their range of motion on a scale of 1 to 7 with 1 being no motion, 2 through 5 were fractions of normal motion, 6 was normal motion, and 7 was excessive motion. The average starting range of motion was 4.3 and ending range of motion was 5.1. Before Prolotherapy 30% had very limited motion (49% or less of normal motion), this decreased to only five percent after Prolotherapy. Prior to Prolotherapy only 36% had 75% or greater of normal range of motion but this improved to 75% after Prolotherapy. (*See Figure 3.*)

Pain Medication Utilization. Sixty percent discontinued pain medications altogether after Prolotherapy. In all, 75% of patients on medications at the start of Prolotherapy were able to decrease them by 75% or more after Prolotherapy. None of the patients had to increase pain medication usage after stopping Prolotherapy. Before Prolotherapy the average patient was taking 1.1 pain medications but this decreased to



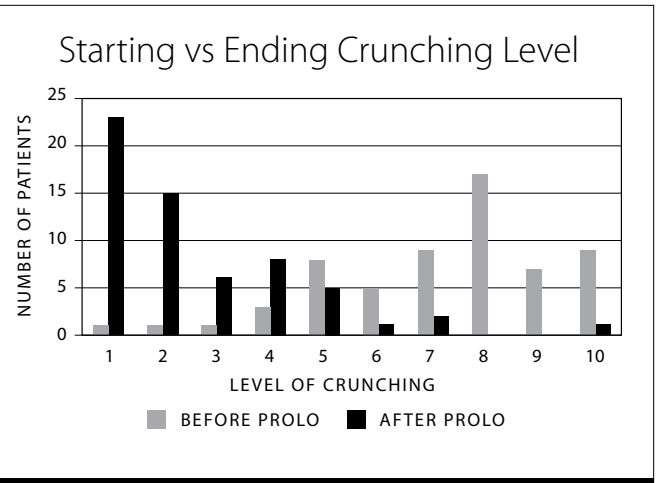


Figure 2. Starting and ending pain, stiffness, and cruching levels before and after receiving Hackett-Hemwall dextrose Prolotherapy in 61 patients (94 hips) with unresolved hip pain.

0.3 medications after Prolotherapy. Before Prolotherapy 23% of patients were on two or more pain medications, but this decreased to 2% after Prolotherapy. Sixty-nine percent of clients using additional pain management therapies before Prolotherapy were able to decrease them by 75% or more after treatment.

Walking Ability. Before Prolotherapy, 59% of patients experienced compromised walking ability, but this decreased to 39% after Prolotherapy. Specifically, 38% could walk three blocks or less before Prolotherapy,

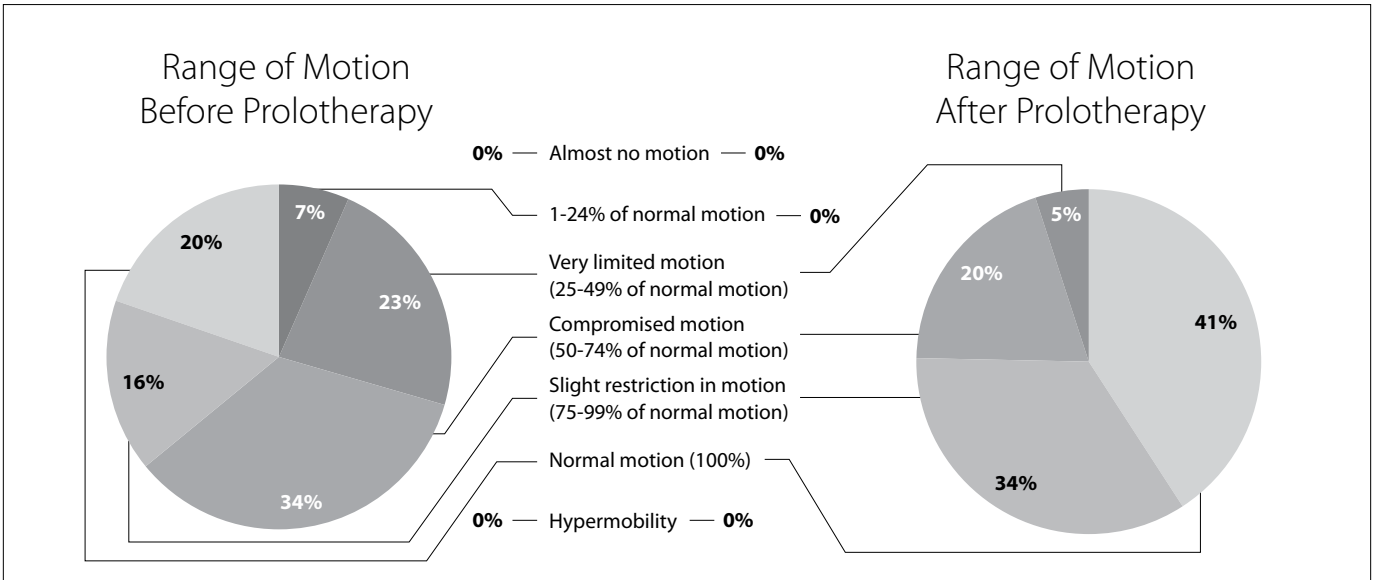


Figure 3. Starting and ending range of motion before and after receiving Hackett-Hemwall dextrose Prolotherapy in 61 patients (94 hips) with chronic hip pain.

but this decreased to 10% after Prolotherapy. While 27% of patients could walk less than one block before Prolotherapy, all could walk greater than that distance after Prolotherapy. (*See Figure 4.*)

Exercise and Athletic Ability. In regard to exercise or athletic ability prior to Prolotherapy, 30% reported totally compromised ability (couldn't do any athletics), seven percent ranked it as severely compromised (less than 10 minutes), 23% ranked it as very compromised (less than 30 minutes) and a total of 84% ranked it as at least somewhat compromised. After treatments, 80% of patients were able to do 30 or more minutes of exercise with 40% not being compromised at all. (*See Figure 5.*)

Disability. In regard to quality of life issues prior to receiving treatment, 40% had an overall disability of at least 50% (could only do about half of the tasks they wanted to). This decreased to 11% after Prolotherapy. Sixty-seven percent noted they had at least a 25% overall disability prior to treatments and this decreased to 24% after.

Before receiving Prolotherapy, five of the patients were dependent on someone for activities of daily living (dressing self and additional general self care). All five regained complete independence after Prolotherapy. Before Prolotherapy 11% considered themselves completely disabled in regards to their work situation, but this decreased to seven percent after Prolotherapy.

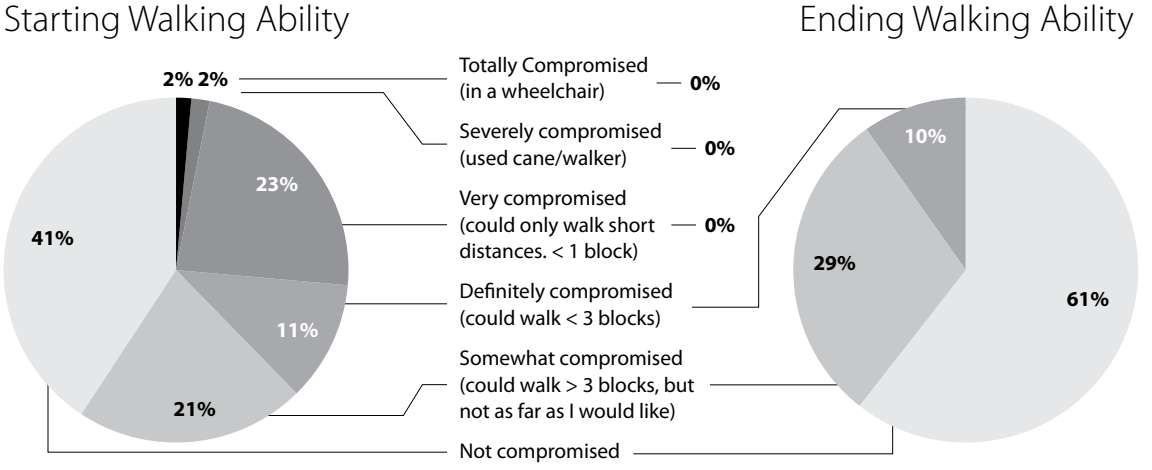


Figure 4. Starting and ending walking ability before and after receiving Hackett-Hemwall dextrose Prolotherapy in 61 patients (94 hips) with chronic hip pain.

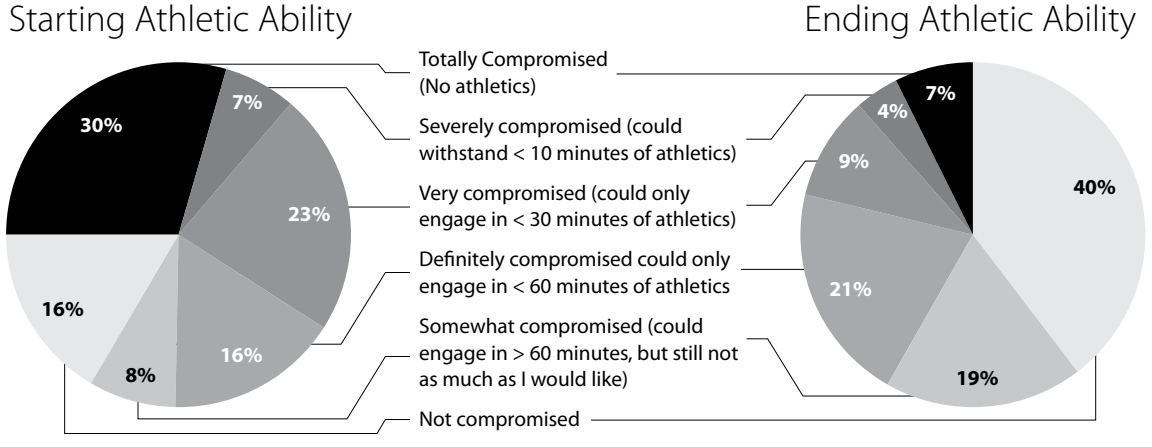


Figure 5. Starting and ending athletic (exercise) ability before and after receiving Hackett-Hemwall dextrose Prolotherapy in 61 patients (94 hips) with chronic hip pain.

Depression and Anxiety. Prior to Prolotherapy, 46% of patients had feelings of depression and 52% had feelings of anxiety. After treatments, only 13% had depressed feelings and 21% had feelings of anxiety.

Sleep. Seventy-two percent of patients reported their pain interrupted their sleep prior to Prolotherapy treatments and 71% subsequently experienced improvements in their sleeping ability.

Quality of Life. To a simple yes or no question: *Has Prolotherapy changed your life for the better?* 98% of patients treated answered "yes." In quantifying the response:

- Seventy-five percent felt their life was at least very much better from Prolotherapy.
- Sixty percent stated that the results from Prolotherapy have very much continued (>75%) to this day.
- Ninety-eight percent felt that they still have some benefits from the Prolotherapy they received.

When patients experiencing some regression were asked, "Are there reasons besides the Prolotherapy effect wearing off that are causing some return of my pain/disability?" 81% answered "yes." The patients noted the reasons for some of their returning pain were:

- stopped Prolotherapy treatments too soon (before pain completely gone) – 50%
- re-injury – 12%
- new area of pain – 14%
- had increased life stressors – 10%
- had other explanations for the pain – 14%

Of the patients whose pain recurred after Prolotherapy was stopped, 80% were planning on receiving additional Prolotherapy treatments.

Patient Satisfaction. Eighty-five percent of patients knew someone who had received and benefited from Prolotherapy. In fact, seventy-five percent came to receive their first Prolotherapy session because of the recommendation of a friend. Eighty-nine percent of patients treated considered the Prolotherapy treatment to be very successful (greater than 50% pain relief). (*See Figure 6.*) Ninety-seven percent noted the Prolotherapy was at least somewhat successful (greater than 25% pain relief). All 100% noted some benefit in their pain with treatment. None indicated that the Prolotherapy treatments made them worse. Ninety-five percent have recommended Prolotherapy to someone.

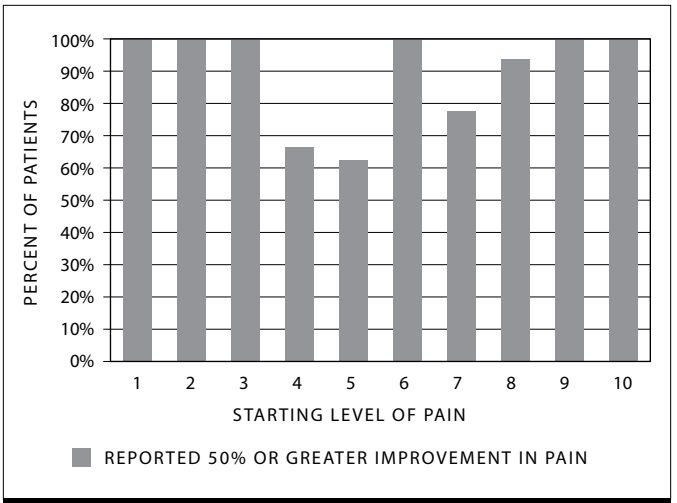


Figure 6. Percentage of patients who reported 50% or greater pain relief after receiving Hackett-Hemwall dextrose Prolotherapy.

SUBGROUP ANALYSIS

Patient percentages were also calculated for patients who answered "yes" to either of the following two statements:

1. "Before starting Prolotherapy it was the consensus of my medical doctor(s) that there were no other treatment options that he/she knew to get rid of my chronic pain." and
2. "Before starting Prolotherapy my only other treatment option was surgery."

"No Other Treatment Options" Subgroup. Twenty patients had been told by their doctors that there were no other treatment options for their pain prior to presenting for Prolotherapy. As a group they suffered with pain on average 69 months, saw 3.2 physicians and were on 1.5 medications for pain. Sixty percent of these patients had pain longer than six years. In analyzing these patients, they had a starting average pain level of 8.1 and after Prolotherapy 3.1. Prior to Prolotherapy, 65% of the patients rated their pain as a level eight or higher and none rated it a three or less. After Prolotherapy none rated it an eight or higher and 70% rated it a three or less. (*See Figure 7.*)

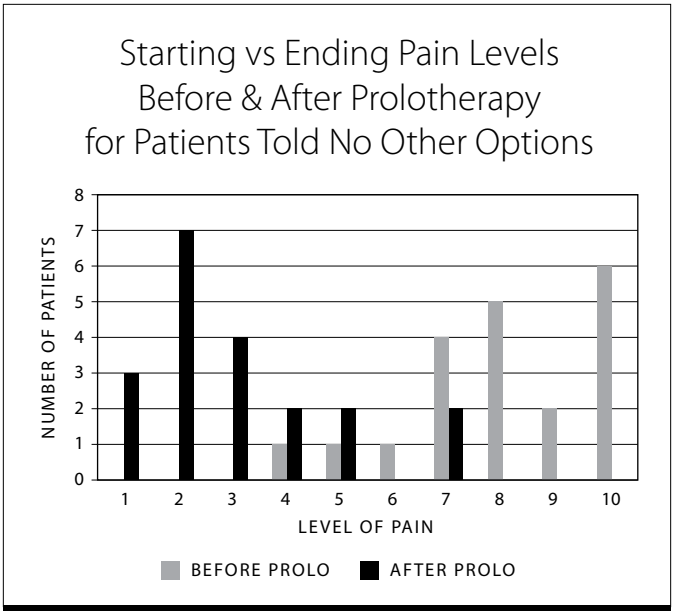


Figure 7. Starting and ending pain levels before and after Hackett-Hemwall dextrose Prolotherapy in 20 patients who were told that no other options existed for their chronic hip pain.

Starting levels of stiffness and crunching levels were 5.9 and 3.1 and ending levels of 2.7 and 1.4, respectively. In regard to range of motion, prior to Prolotherapy only 33% had 75% or greater normal range of motion, but this increased to 75% after Prolotherapy. As a group, prior to Prolotherapy, 60% noted in regards to activities of daily living, they could not do at least 50% of the tasks they wanted to do. This decreased to 15% after Prolotherapy. Twenty percent of patients before Prolotherapy could walk one block or less, but all could walk over a block after Prolotherapy. Only 35% percent said they were not compromised in regard to walking before Prolotherapy, but this increased to 60% after Prolotherapy. Before Prolotherapy 30% could not exercise at all, whereas after Prolotherapy this was down to three percent. Only five percent ranked their exercise ability as not compromised before Prolotherapy, but after Prolotherapy 67% rated it as not compromised. (*See Figure 8.*) For those patients on pain medication, 80% were able to decrease them by 50% or more after treatments. Twenty-five percent of patients on pain medications were able to stop taking them after Prolotherapy. Eighty-five percent were able to decrease their need for additional pain therapies by 50% or more.

Eighty percent of these patients noted the Prolotherapy treatment gave them greater than 50% pain relief with 50% of them receiving 75% or greater pain relief. In response to the question *Has Prolotherapy changed your life for the better?* 100% answered "yes." All 100% have recommended Prolotherapy to someone else. (*See Table 2.*)

"Surgery is the Only Treatment Option" Subgroup. This group represents 13% of the patients (eight in number). As a group they saw on average 4.2 physicians and were taking 1.8 pain medications prior to Prolotherapy. They had pain for an average of 44 months. Initial average pain level was 8.4, which decreased to 2.4 after Prolotherapy. Eighty-eight percent had a pain level of eight or more before Prolotherapy. None had a pain level under a seven before Prolotherapy. After Prolotherapy, all had a pain level of five or less with 63% of them having

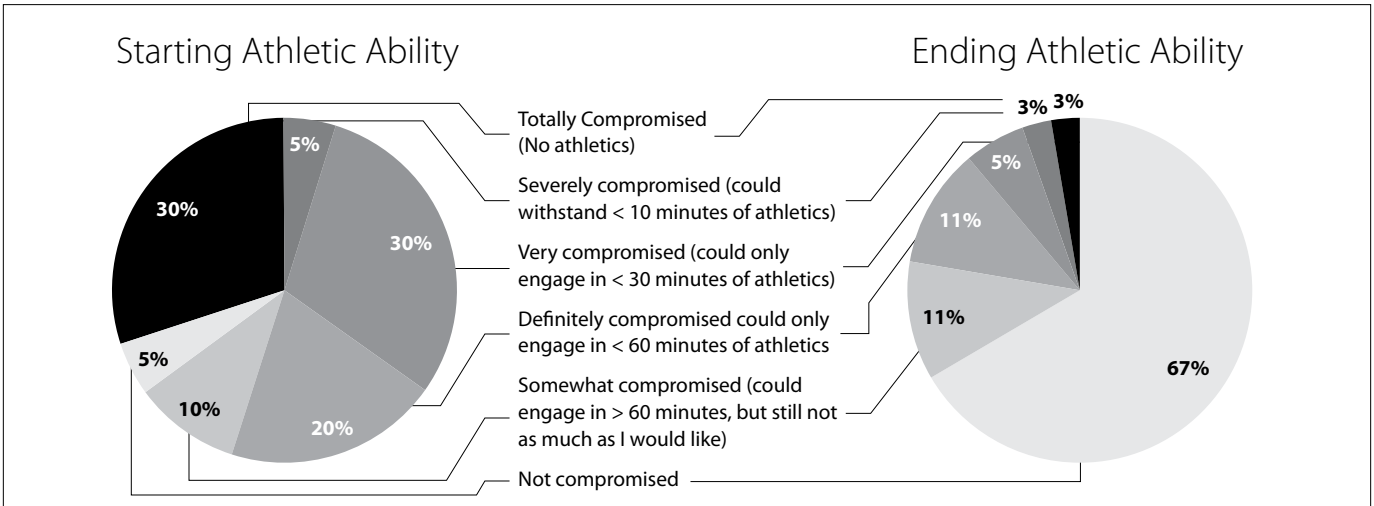


Figure 8. Starting and ending athletic (exercise) ability before and after Hackett-Hemwall dextrose Prolotherapy in 20 patients told no other options existed for their chronic hip pain.

Table 2. Outcome measures for 20 patients told no other treatment options were available for their condition prior to undergoing Prolotherapy treatment.

Outcome Measures	Starting	Ending
Average pain level	8.1	3.1
Percentage of patients w/pain level 8 or greater	65%	0%
Percentage of patients w/pain level 3 or less	0%	70%
Average stiffness	5.9	2.7
Average crunching sensation	3.1	1.4
Patients with 75% or greater range of motion	33%	75%
Patients with less than half normal hip motion	30%	5%
Patients not able to do at least 50% of tasks they wanted to do	60%	15%
Inability to exercise	30%	3%
Uncompromised ability to exercise	5%	66%
Patients felt at least some depression	50%	20%
Patients felt at least some anxiety	65%	20%

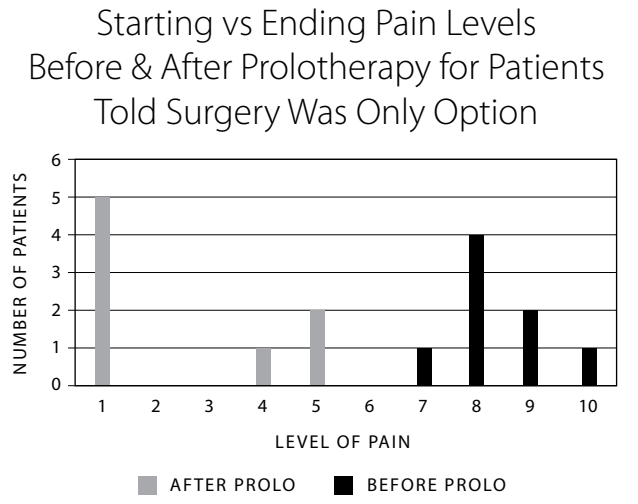


Figure 9. Starting and ending pain levels before and after Hackett-Hemwall dextrose Prolotherapy in eight hip pain patients told surgery was their only treatment option.

no pain. (*See Figure 9.*) On average, 19 months after their last Prolotherapy treatment, as a group they stated that 100% of their improvement in daily pain had continued. Before Prolotherapy their starting stiffness and crunching levels were 4.0 and 1.8 respectively, whereas the ending stiffness and crunching levels were 2.0 and 1.2. Sixty-two percent stated they had greater than 75% pain relief and a full 100% (eight of eight) had 50% or greater pain relief with Prolotherapy. In regard to range of motion, before Prolotherapy 89% of the patients had 74% or less of normal motion, whereas after Prolotherapy, 75% had 75% or greater of normal motion. Fifty percent had normal range of motion. (*See Figure 10.*)

Before Prolotherapy 87% noted an overall disability of 25% or greater, but this decreased to 13% after Prolotherapy. Sixty-two percent could walk one block or less before Prolotherapy, but all of these patients could walk greater than one block after Prolotherapy. All 100% could only exercise 30 minutes or less before Prolotherapy,

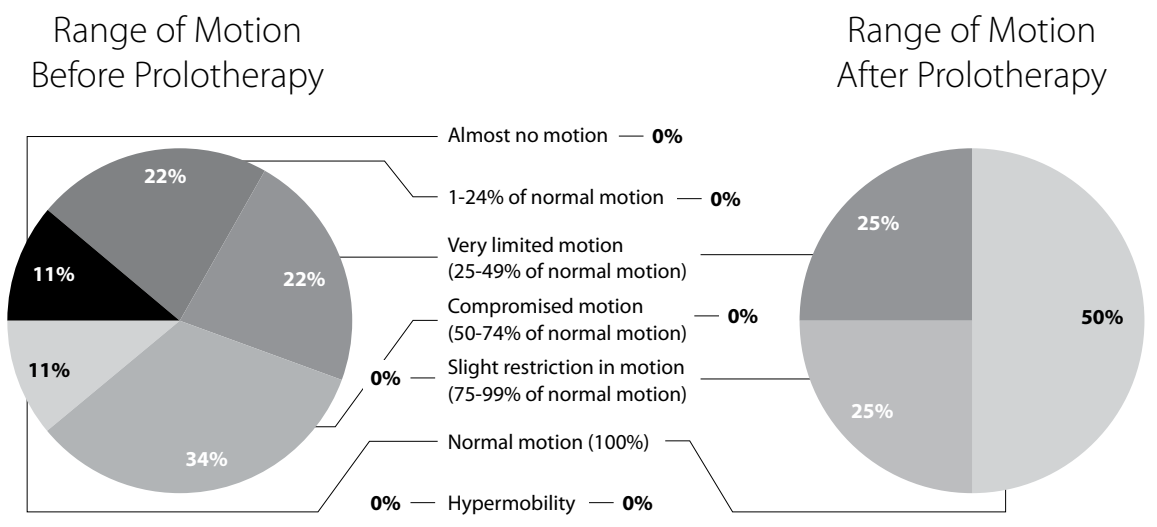


Figure 10. Starting and ending range of motion levels before and after Hackett-Hemwall dextrose Prolotherapy in eight hip pain patients told surgery was their only option.

but after Prolotherapy 74% could exercise more than 30 minutes per day. Before Prolotherapy, 100% were taking pain medications, but after Prolotherapy 75% were taking no medications. Since their last Prolotherapy treatment 75% (six of eight) are still not on any pain medications and the other two patients are just on one medication. All 100% said that Prolotherapy changed their life for the better.

Statistical Analysis

A matched sample paired t-test was used to calculate the difference in responses between the before and after measures for pain, stiffness and range of motion for the 94 hips, including the subgroup of twenty patients who before starting Prolotherapy were told there were no other treatment options and the eight patients told by their medical doctor(s) there was no other treatment option but surgery. Using the paired t-test, all p values for pain for all subgroups reached statistical significance at the $p<.0001$ level. For the 94 hips, the p values for pain, stiffness, and range of motion all showed statistically significant improvements at the $p<.0001$ level.

Discussion

PRINCIPLE FINDINGS

The results of this retrospective, uncontrolled, observational study, show that Prolotherapy helps decrease pain and improve the quality of life of patients with chronic hip pain. Decreases in pain and stiffness and improvements in range of motion reached statistical significance even in patients whose medical doctors said there were no other treatment options for their hip pain or that surgery was their only option. Ninety-five percent of patients stated their pain was better after Prolotherapy. Over 70% said the improvements in their pain, crunching and stiffness since their last Prolotherapy session have very much continued (75% or greater). Eighty-nine percent of patients stated Prolotherapy relieved them of at least 50% of their pain. Fifty-nine percent received greater than 75% pain relief. Only two patients had less than 25% of their pain relieved with Prolotherapy. More than 82% showed improvements in walking ability, exercise ability, anxiety, depression, sleep and overall disability with Prolotherapy. Eighty-five percent of patients who were on medications were able to cut their medication usage by 50% or more after Prolotherapy. They were able to lessen additional pain management care by 50% or more in 69% of cases. Ninety-eight percent said that dextrose Prolotherapy changed their life for the better. (*See Table 3.*)

STRENGTHS AND LIMITATIONS

Our study cannot be compared to a clinical trial in which an intervention is investigated under controlled conditions. Instead, it is aimed to document the response of patients with unresolved hip pain to the Hackett-Hemwall technique of dextrose Prolotherapy at a charity medical clinic. Clear strengths of the study are the numerous quality of life parameters that were studied. Quality of life issues such as walking ability, stiffness, range of motion, activities

Table 3. Summary of results of Hackett-Hemwall dextrose Prolotherapy hip study.

Demographics	All Hip Patients	No Other Treatment Option	Surgery Only Option
Total number of patients	61	20	8
Months of pain	59	69	44
# of pain meds used before Prolotherapy	1.1	1.5	1.8
# of pain meds used after Prolotherapy	0.3	0.5	0.2
Pain level before Prolotherapy	7.2	5.0	7.1
Pain level after Prolotherapy	2.6	3.0	2.4
Stiffness level before Prolotherapy	4.4	6.0	4.0
Stiffness level after Prolotherapy	2.1	2.7	2.0
Greater than 50% pain relief	89%	80%	100%
Athletic Ability > 30 Minutes of Exercise before Prolotherapy	40%	35%	0%
Athletic Ability > 30 Minutes of Exercise after Prolotherapy	83%	88%	74%
Prolotherapy changed life for the better	100%	100%	100%

of daily living, athletic (exercise) ability, dependency on others, work ability, sleep, anxiety and depression—in addition to pain level—are important factors affecting the person with chronic hip pain. Decreases in medication usage and additional pain management care were also documented. The improvement in such a large number of hips who were treated solely by Prolotherapy is likely to have resulted from the treatment. Many of the above parameters are objective with progress noted in the increased ability to walk, exercise, work and the need for less medications or other pain therapies.

The quality of the cases treated in this study is notable. The average person in this study experienced unresolved hip pain for over five years and saw over three physicians prior to Prolotherapy treatment. Twenty-eight (46%) of the patients were either told by their doctor(s) that there were no other treatment options for their pain or that surgery was their only option. So clearly this patient population represented chronic unresponsive hip pain. A follow-up time of nineteen months since their last treatment session provided a measure of the long-lasting effect of this modality.

Because this was a charity medical clinic with limited resources and personnel, the only therapy that was offered was Prolotherapy given every three months. In private practice, the Hackett-Hemwall technique of dextrose Prolotherapy is typically given every four to six weeks. If a patient is not improving or has poor healing ability, the Prolotherapy solutions may be changed and strengthened or the patient is advised about additional measures to improve their overall health. This can include advice on diet, supplements, exercise, weight loss, changes in medications, additional blood tests, and/or other medical care. Patients are typically weaned immediately off of anti-inflammatory and narcotic medications that inhibit the inflammatory response that is needed to achieve a healing effect from Prolotherapy. Since none of these were done in this study, the results of this study are expected to be the least optimum level of success achievable with Hackett-Hemwall dextrose Prolotherapy. This makes the results even more impressive.

A shortcoming of our study is the subjective nature of some of the evaluated parameters. Subjective parameters of this sort included pain, stiffness, anxiety, depression and disability levels. The results relied on the answers to questions by the patients. Another shortcoming is that any additional pain management care that they may have been receiving was not controlled. What was documented was the change in pain levels with Prolotherapy. There was also a lack of X-ray and MRI correlation for diagnosis and response to treatment. A lack of physical examination documentation in the patients' charts made categorization of the patients into various diagnostic parameters impossible.

POTENTIAL IMPLICATIONS OF FINDINGS

While the exact cause of chronic hip pain is still debated, this study did show that the Hackett-Hemwall technique of dextrose Prolotherapy improves not only pain and stiffness levels of those with chronic hip pain but also a host of other quality of life measures. Current conventional therapies for unresolved hip pain include medical treatment with analgesics, non-steroidal anti-inflammatory drugs, anti-depressant medications, steroid shots, trigger point injections, muscle strengthening exercises, physiotherapy, weight loss, rest, massage therapy, manipulation, orthotics, surgical treatments including total hip replacement, multidisciplinary group rehabilitation, education and counseling. The results of such therapies often leave the patients with residual pain.[33-35] Because of this many patients with chronic hip pain are searching for alternative treatments for their pain.[36,37] This is especially true for those who have been told they need a hip replacement in the future. They realize that total hip replacement surgeries carry with them significant risk including prosthesis failure, sciatic nerve injury, infection, post-op blood clot and potential for continued pain.[38,39] For younger clients especially those under the age of 50, the notion of a second more complicated revision hip replacement in the future is not a very appealing prospect.[40] Six to 12 months after a hip joint replacement, pivoting or twisting on the involved leg should be avoided. As there are over 120 hip replacement systems, the hip replacement market is driving more and more conservative surgeries.[41] Despite much fanfare, there is little scientific evidence of the purported advantages of minimally invasive joint replacement and hip resurfacing over conventional joint replacement.[42] One of the treatments that chronic hip pain patients are trying instead of surgery is Prolotherapy.[43]

Prolotherapy is the injection of a solution for the purpose of tightening and strengthening weak tendons, ligaments or joint capsules. Prolotherapy works by stimulating the body to repair these soft tissue structures. It starts and accelerates the inflammatory healing cascade by which

fibroblasts proliferate. Fibroblasts are the cells through which collagen is made and by which ligaments and tendons repair. Prolotherapy has been shown in one double-blinded animal study in a six-week period to increase ligament mass by 44%, ligament thickness by 27% and the ligament-bone junction strength by 28%.[44] In human studies on Prolotherapy, biopsies performed after the completion of Prolotherapy showed significant increases in collagen fiber and ligament diameter of 60%.[45,46] This is significant since degenerative osteoarthritis has been in many cases known to be caused by joint instability caused by ligament injury.[47] Thus, Prolotherapy has the potential to stop the degenerative joint disease process and some preliminary and anecdotal evidence shows that in some cases it can reverse it.[48,49] (*See Figure 11.*)

For most cases of chronic hip pain, the cause of the pain is presumed to be cartilage degeneration. Because the average person moves his/her hip one million times per year during activities of daily living, it is no wonder that over time this wear and tear can begin to break down the joint.[50] Besides the pain and disability that degenerative arthritis causes, there is a tremendous cost. About 20% of the costs result from ambulatory care services and up to one third from pain medications. Forty-five percent of costs are hospital charges, as an estimated 400,000 people each year undergo a hip replacement alone.[51] The average hospital costs in Chicago per hip replacement is over $45,000 each. Surgeon and prosthesis costs are between $15,000-18,000 with total costs per hip including hospital stay, surgeons fee, MRI and X-ray studies and post-operation rehabilitation being over $75,000.[52,53] Compare those figures to the average cost per Prolotherapy treatment to the hip of $300 to $400.[54] (*See Table 4.*) If, as in this study, the average person receives four to five Prolotherapy sessions to complete therapy, the total cost of Prolotherapy for a chronic hip patient would be on the order of $1500 to $3000. Thus, each person who received Prolotherapy instead of a hip replacement would, at minimum, save the health care system on the order of $72,000. These costs do not include patients whose hip replacements fail or need to

Table 4. Average cost of total hip replacment in the Chicagoland health care system.

Description of Cost	Cost (in 2007 dollars)
Cost of hip replacement (total)	$45,000 +
Cost of surgeon	$10,000
Cost of prosthesis	$8,000
Cost of MRI and/or X-rays	$3,500
Cost of rehabilitation	$6,000
Annual economic burden per year for disabled hip client	$20,000

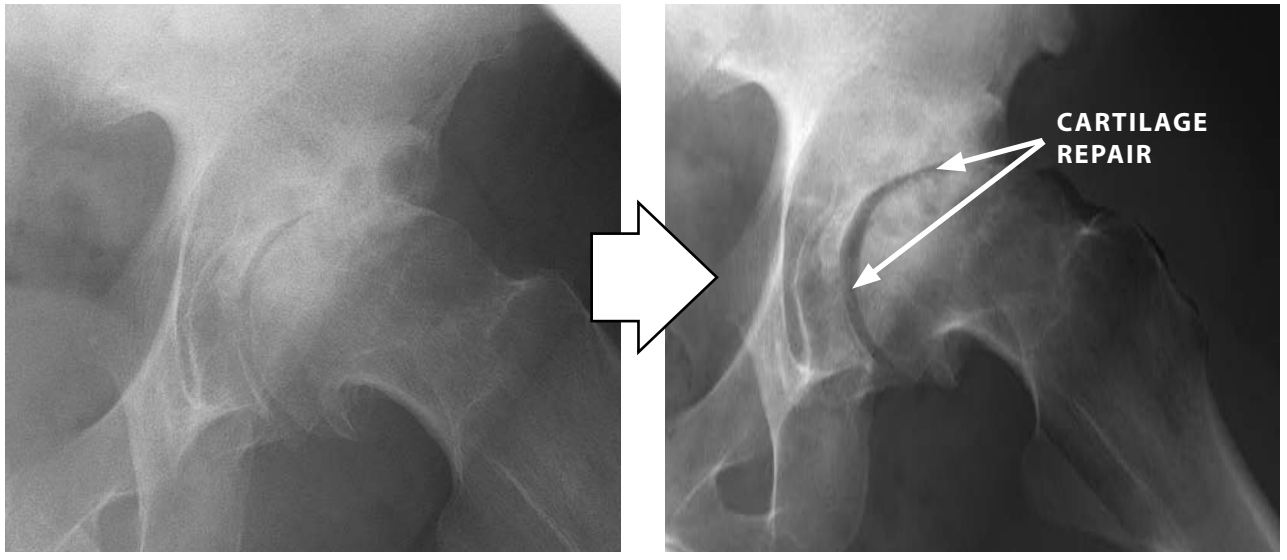


Figure 11. Prolotherapy regeneration of hip cartilage. Before and after hip X-rays of a patient treated with Prolotherapy.

be revised. This also does not include the lifetime cost savings in medication and ancillary pain management usage, as well-as the cost savings for patients who would not need a hip replacement because of the Prolotherapy treatment received. It has been shown that hip pain is the major predictor of radiographic hip osteoarthritis that progresses to eventual hip replacement.[55] If this group of patients were to receive Prolotherapy at the start of their pain, prior to significant radiographic hip osteoarthritis, the potential cost savings would be tremendous if these patients were to no longer need a hip replacement. Thus, the actual costs savings over a lifetime with Hackett-Hemwall dextrose Prolotherapy in patients with unresolved hip pain would most likely be well in excess of $100,000 per hip patient. If this occurred for 250,000 patients per year, the cost savings to the United States health care system could potentially be over 25 billion dollars per year. Future studies should be done to determine if indeed Prolotherapy can keep chronic hip pain sufferers from needing total hip replacements.

Conclusions

The Hackett-Hemwall technique of dextrose Prolotherapy used on patients who presented with over five years of unresolved hip pain were shown in this retrospective pilot study to improve their quality of life even 19 months subsequent from their last Prolotherapy session. The 61 patients with 94 hips treated reported significantly less pain, stiffness, crunching sensation, disability, depressed and anxious thoughts, medication and other pain therapy usage, as well as improved walking ability, range of motion, sleep, exercise ability, and activities of daily living. This included patients who were told there were no other treatment options for their pain or that surgery was their only option. The results confirm that Prolotherapy is a treatment that should be highly considered for people suffering with chronic hip pain. Future studies will be needed to confirm this pilot study and to document if Prolotherapy can keep chronic hip pain sufferers from needing hip surgeries including hip replacements. ■

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