



*Enhancing Health And
Function Through Education
And Research In The Field Of
Physical Medicine And
Rehabilitation*

PHYSIATRIST'S VOICE

NEWSLETTER

SEPTEMBER 2017

PRESIDENT'S MESSAGE

Matthew D. Imfeld, MD



Hello All,

I hope everyone had a wonderful summer and was able to take some time off to relax and rejuvenate with family and friends. I was very fortunate to be able to spend a few long weekends with my adult kids at Bellaire Beach. It is difficult to get everyone together now-a-days since they are working and scattered in Nashville and NYC. We had a blast and most were "responsible" tanners.

I can't believe it is fall already. I am glad because I love college football, but of course, with fall in Florida and the Gulf states, comes hurricane season. And not, "It's all about the U, Hurricanes." It has been a wild and wooly (showing my age) last few weeks. My prayers and crossed fingers went out to our fellow citizens in Houston with Harvey. Then, along comes Irma for our viewing pleasure. I hope that no one had any bodily injuries, just the annoyances of no power, internet, phone and fax. I'm sure it will be a few weeks before all of those conveniences are at 100%. It is amazing how much work cannot be done without wifi or fax. We still do not have either at the office currently and we even tried to pulling the "doctor card" with Spectrum Business Solutions. Of course it did not help. Only 4 percent of their Orange County "nodes" are online. Good luck to all, as you slowly get back to normal. Also, good luck to those who have kids and grandkids who are embarking on a new school year.

The national meeting for AAPM&R is in Denver, Colorado, October 12- 15. I hope many of you will be able to attend. As you know, it is the largest collection of physiatrists in one spot every year. This year in Denver is no exception. So if you're looking for information, recruitment or just reconnecting with old friends I encourage you to attend.

We have a new CAC representative. I want to thank Dr. Mitchell Freed for volunteering for this position. It is very helpful to have a connection with CMS to get a gauge on what changes they may be planning. I also want to thank the Board and Lorry Davis, our Executive Director, for their continued support as we move along this ever changing path of medicine.

Please remember if you have any questions or concerns about what is happening for PM&R in Florida feel free to reach out to us. We are here to serve you all. Thanks and again good luck in getting back to normal following Irma.

Sincerely,
Matthew Imfeld, MD
FSPMR President

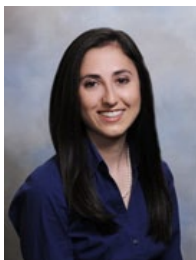
IN THIS ISSUE

- 1 President's Message
- 2 - 6 Residents Section
- 7 Narcotic Use and Abuse in the USA
- 9 Successful Treatment Of A Chronic, Partially Ruptured Distal Biceps Tendon with Platelet Rich Plasma: A Case Report
- 22 Upcoming Events
- 23 Job Ops / Other Ops





RESIDENTS SECTION



Patricia Goodwin, DO, PGY-3
Larkin Community Hospital
Department of PM&R
AOCPMR Resident Council
Secretary/Treasurer

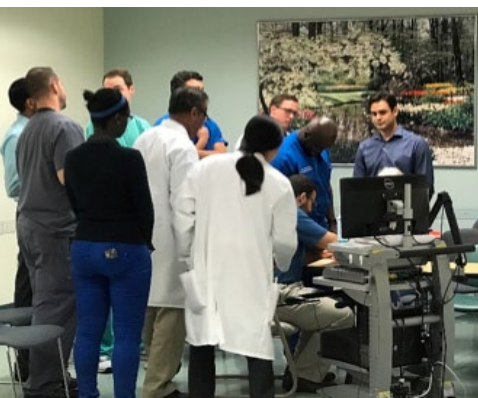
Larkin Community Hospital PM&R Residency Update

Larkin PM&R kicked off the new academic year with the First Annual PM&R BBQ that took place on July 2 at the Marine Environmental Education Center on Hollywood Beach. The new chief residents, Daniel Grabarek, DO, PGY-4 and Sandeep Kola, DO, PGY-4 were officially congratulated on their new positions and the incoming PGY-2s were welcomed to the Larkin PM&R family. One of the

many wonderful aspects of the Larkin PM&R residency program is our location, where residents can enjoy beautiful beaches and sunny weather year round.

The Larkin Graduate Medical Education and PM&R Department received ACGME pre-accreditation status during the last academic year. The transition process continues to remain in full swing in order to meet the July 2020 implementation date.

Congratulations to the residents who hold positions on the AOCPMR residency council this year, Daniel Grabarek, DO, PGY-4 (Vice President), Patricia Goodwin, DO, PGY-3 (Secretary/Treasurer), Alexander Morales, DO, PGY-3 (Website Co-Chair), Shiel Jhaveri, DO, PGY-3 (Website Co-Chair), and Marjorie Mamsaang, DO, PGY-3 (Regional Representative). The AOCPMR residency council is just one way the Larkin PM&R residents are contributing to the field and making things happen on a nationwide level.



EMG/NCS Workshop

The West Palm Beach Veterans Administration Medical Center PM&R Department hosted an EMG/NCS workshop for Larkin PM&R residents on August 14. The workshop was led by Ramon Cuevas-Trisan, MD. Residents were able to get hands on experience using EMG/NCS machines and practice their neurophysiologic techniques to diagnose and evaluate patients.

Assistant Clinical Faculty, Associate Professor, or present a lecture in your field of expertise, please contact the PM&R Program Director, Jose Diaz, DO (josediaz@larkinhospital.com) and Maikel Gonzalez (mgonzalez@larkinhospital.com) the Graduate Medical Education Program Coordinator.



Residents at the First Annual PM&R BBQ
on Hollywood Beach



2017-2018 Larkin PM&R Residents



RESIDENTS SECTION



Christopher Alexander, M.D.
PGY-3 Resident
Department of PM&R
University of Miami Miller School
of Medicine



Andrew Sherman, MD, MS
Residency Program Director
FSPMR Member-at-Large
University of Miami Miller School
of Medicine

University of Miami Miller School of Medicine/Jackson Memorial Hospital PM&R Residency Update

The University of Miami Miller School of Medicine/Jackson Memorial Hospital PM&R Residency Program has had a very productive start to the academic year so far. We are continuing to flourish under the strong leadership of newly elected chief residents, Joslyn Gober D.O. and Diana Molinares M.D.

Moreover, We are very excited to welcome six new PGY-2's as well as one PGY-3 transfer and two spinal cord injury fellows!

PGY-2 Class:

Martin Weaver, M.D.
Internship: Cooper University- Camden, NJ
Medical School: Cooper Medical School of Rowan University- Camden, NJ

Myriam LaCerte, M.D.
Internship: Providence Hospital- Southfield, MI
Medical School: St. George's Medical School- Grenada

Thomas Tokarz, D.O.
Internship: Transitional- Walter Reed National Medical Center- Bethesda, MD
Medical School: NOVA Southeastern University College of Osteopathic Medicine- Fort Lauderdale, FL

Marine Dididze, M.D.
Internship: Surgery- Jackson Memorial Hospital- Miami, FL
Medical School: Tbilisi State Medical University- Geo, Georgia

Kazi Hassan, M.D.
Internship: Transitional- Orange Park Medical Center- Jacksonville, FL
Medical School: Tuft's University School of Medicine

Jorge Caceres, M.D.
Internship: Transitional- San Juan City Hospital- San Juan, PR
Medical School: Universidad Central del Caribe- Bayamon, PR

PGY-3 class:

Andrew Chang, M.D.
Previous residency: Washington University in St. Louis/ Barnes Jewish Hospital- St. Louis, MO
Internship: Detroit Medical Center- Detroit, MI
Medical School: Ross University School of Medicine



RESIDENTS SECTION

University of Miami Miller School of Medicine/Jackson Memorial Hospital PM&R Residency Update

(continued from previous page)

Spinal Cord Injury Fellows:

Ori Schnitzer, M.D.

Residency: Jackson Memorial Hospital/University of Miami- Miami, FL

Internship: Mount Sinai- Elmhurst Hospital- Queens, NY

Cara Thomas, M.D.

Residency: Schwab Rehabilitation Hospital- Chicago, IL

Internship: Stamford Hospital- Stamford, CT

Medical School: Stony Brook University School of Medicine- Stony Brook, NY

We look forward to a strong showing in Denver for the 2017 AAPM&R Annual Assembly in October. In addition to attending lectures and learning more about advancements on the horizon in our field, we also look forward to networking and connecting with residents, students, and leaders in PM&R from around the country. The University of Miami PM&R Department will be well represented in this national forum, as our residency program will be displaying multiple posters in the Exhibition Hall during the conference:

Lin, K., Nguyen, H., Sherman, A. *Improving Patient Care: Resident pocket guide and handouts of therapeutic exercises for common musculoskeletal (MSK) disorders for patients in an outpatient indigent PM&R clinic.*

Molinares, DM., Charnoff, J., Khurana, S. *Challenging Cases of Ultrasound Guided Baclofen Pump Refills: A Case Series.*

Molinares, DM., Ference T. *A rare case of single upper extremity lymphedema in a patient with Systemic Lupus Erythematosus: A case report.*

Molinares, DM., Alexander C., Sherman A. *Ischial bursitis with sciatica like symptoms and fluoroscopic-guided steroid injection as a successful treatment option.*

Cross, A., Khurana, S. *Functional Outcomes of Patients After Bilateral Lung Transplant: A Case Series.*

Chang, A., Bonnette, M., Bijlani, R., Carr, D. *Risk Factors for Acute Care Transfers in the Inpatient Rehabilitation Setting and Early Warning Systems: A Review of the Literature.*

Chang, A., Huskey, T. *Diverticular Associated Colitis After Gastric Tube Placement in a Hemorrhagic Stroke Patient with Severe Dysphagia: A Case Report.*

Our program has been very involved in the community locally as well. Residents Christopher Alexander M.D., Benjamin Mendelsohn M.D., and Joslyn Gober D.O., represented the UM Department of PM&R at the Florida International University Herbert Wertheim College of Medicine Annual Residency Fair in May. We thoroughly enjoyed discussing the field of PM&R with the FIU medical students, and look forward to working with their newly



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RESIDENTS SECTION

University of Miami Miller School of Medicine/Jackson Memorial Hospital PM&R Residency Update

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established PM&R interest group in the future. In the upcoming months, we will also be taking part in community service initiatives such as local hypertension screenings as well as staffing the San Juan Bosco Center, a free clinic geared towards serving indigent patient populations with limited access to medical care.

We are pleased to announce that one of our PGY-3's, Aaron Cross D.O., won second place at the West Virginia Society of Interventional Pain Physicians Annual Assembly this year for his poster presentation: A Systematic Review of the Clinical Effectiveness of Botulinum Toxin A in Upper Back Myofascial Pain Syndrome. We are very proud of Aaron!

Additionally, our program is celebrating the success of PGY-4, and newly elected chief resident, Diana Molinares M.D., who has matched into a cancer rehabilitation fellowship at The University of Texas: MD Anderson in Houston, Texas. This is widely regarded as one of the best cancer rehabilitation programs in the country!

Finally, we would like to acknowledge our phenomenal program coordinator, Coretha Davis, whose tireless hard work, dedication, and selfless support of our residents and faculty means so much to us. We look forward to another great academic year, and to updating the constituents of FSPMR about the upcoming exciting events occurring within the department of Physical Medicine and Rehabilitation at the University of Miami Miller School of Medicine.



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RESIDENTS SECTION



Morgan Pyne, DO
Physical Medicine and Rehabilitation PGYII
University of South Florida Residency
Program Liaison

University of South Florida PM&R Residency Update

This year has kicked off at full speed once again. With the new second years exceeding our expectations on their clinical rotations thus far, we are looking forward to see what sort of research they can bring to the table. Currently we have residents working on a few different projects. Morgan Pyne, PGYIII,

will be presenting her poster, "Myositis Ossificans Causing Ulnar Nerve Compression Neuropathy: A Case Report," at this year's AAPM&R conference in Denver, CO. Morgan is also working on research for Neurofibromatosis Type II along with a paper looking at the Prevalence of Lower Limb Amputation in Patients with Chronic Spinal Cord Injury. Dr. Tony Urbisci, PGYIV, has been working on four separate case studies, along with completing his QI project for the program. Dr. Aaron Martin, PGYIV, has been working on a case series looking at "RFA for vertebral body metastasis" while also completing his QI project by updating our incoming residents orientation handbook. One of our new PGYII's, Dr. Amanda Hanekom, has currently been doing a literature review for a new poly trauma chapter. It's easy to see that everyone has remained busy in keeping up with research!

USF continues to excel in our education as well. We continue to have our monthly lectures from Dr. Randall Braddom and will be starting to having monthly grand round lectures.

Our three seniors are busy preparing for interviews as the fellowship season quickly gets under way. Two of our senior residents are pursuing the pain medicine track with the third senior hoping to get into the sports medicine field. We wish you all the best!





Narcotic Use and Abuse in the USA*

Rodolfo Eichberg MD

Several years ago I wrote an article for The Bulletin* entitled "Pain Killers Kill." Re-reading that article now suggests to me that it was the understatement of the decade. Deaths caused by drug overdose have equaled or surpassed those caused by motor vehicle accidents.

In writing this article, I intend to reflect on fifty years of experience in the musculoskeletal area of medicine. The opinions herein are mine and do not presume to be scientific. They are, in part, a *mea culpa* which all physicians should acknowledge and help to fix.

Instead of reviewing the literature I will list some frequently mentioned claims and comment on them.

Statement #1: Pain training in medical school and residency is minimal and inadequate.

This is true. I would add that it is unscientific and biased in favor of socio-cultural mores and political correctness. What can be more unscientific than declaring that "pain is the fifth vital sign" when pain cannot be objectively measured? Is the patient pointing at a happy or sad face objective or subjective? In my experience, most chronic pain patients are invariably in 9, 10, or excruciating pain. Yet JCAHO, the accrediting and reviewing organization for hospitals and healthcare facilities insists in using the "fifth vital sign" and its management as a quality indicator since 1996. The American Medical Association has moved to eliminate this in 2016. Its elimination is opposed by the American Academy of Pain Medicine (a physician organization) and the American Pain Foundation (consumer organization). The latter organization claims that there is an epidemic of untreated pain. Does this sound like there are vested interests involved?

Statement #2: Medical organizations do not always help.

In 2004 the Federation of State Medical Boards called on state boards to make under-treatment of pain PUNISHABLE. A decade later state medical boards were punishing physicians that dispensed narcotics inappropriately to anybody who claimed to be in pain, creating the "Pill Mill" industry. I wonder if the "patient" pointing to the sad face was no longer enough.

Personally, all this contributed to my career-long decision not to accept chronic pain patients in my practice. The number of lawsuits prompted by alleged under-treatment or over-treatment of pain, and even manslaughter prosecutions for death caused by prescription drugs, can only be guessed.

Statement #3: Medically Induced Epidemic

In the late 1980s or early 90s a keynote speaker at the Annual Meeting of the American Academy of Physical Medicine and Rehabilitation stated that we were cowards, afraid of using narcotics, which he claimed were both safe and effective. In 1986, Russell Portenoy wrote an article based on 38 patients, in which he argued that opioids could be used in people without cancer that had pain. To his credit, he has performed his own *mea culpa* publishing an article in the *Wall Street Journal* reversing his opinion in 2012.

In 1996, Purdue Pharma released OxyContin, a long acting narcotic. Its sales skyrocketed. Why?

At one time doctors were told that the risk of opioid addiction was less than 1%. Credible?

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Narcotic Use and Abuse in the USA*

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In 2012, sales of opioids in the USA totaled 9 billion dollars. Can any public health expert call this judicious use of medical resources?

Recently the state of Ohio filed suit against several pharmaceutical companies, claiming large increases in health care expenditures. Some in the press already compare it to the tobacco lawsuits.

Statement #4: Widely discordant statistics.

- 100 million Americans suffer from chronic pain according to the Institute of Medicine. No other country on earth comes anywhere close. Do one out of three of your friends have chronic pain?
- Prevalence of chronic pain varies between 8% and 60% according to different statistics. Can any statistician explain this?
- Heroin and fentanyl killed 1500 people in the first nine months of 2016 in Maryland, prompting the governor to declare a state of emergency. Can this be called "safe and effective?"
- 4 out of five heroin users started with prescription pain killers (Mark Siegel, NYU/Fox News)
- Illicitly manufactured fentanyl and NOT prescription opioids are now the leading drug in death by overdose Regional variations?



Statement #5: Experience in other countries is very different.

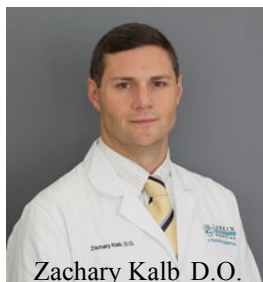
The three most commonly used analgesics in several European countries are acetaminophen, ibuprofen and aspirin. Are Europeans somehow "sturdier" than Americans? Several European countries still use Novalgin/dypirone for acute severe pain. It is not on the USA market. It has infrequent but very serious side effects including shock and agranulocytosis.

Statement#6:

The two health conditions most clearly associated with disability benefits claims, in most First World countries, are musculoskeletal disorders and mental health problems. Could this be associated with the incidence and prevalence of chronic pain?

The President of the AMA, Andrew German, MD, has said that physicians played a key role in starting the so called opioid epidemic, and now must do their part to end it.

*Article published in *The Bulletin* of the Hillsborough County Medical Association, July/August 2017.



Zachary Kalb D.O.

Successful Treatment Of A Chronic, Partially Ruptured Distal Biceps Tendon with Platelet Rich Plasma: A Case Report

Zachary Kalb D.O., Husam Mourtada M.D.
Larkin Community Hospital
Physical Medicine and Rehabilitation

Abstract

Background and Purpose:

Platelet rich plasma (PRP) is an autologous blood product containing a supra-physiologic concentration of platelets. Although the use of PRP in treating tendon pathology is increasing in popularity, the research surrounding its use is still in its infancy and that which exists has produced a wide range of results. Specifically, research surrounding the use of PRP in the management of partial distal biceps tendon ruptures (PDBTR) is scarce. The purpose of this case report is to explore the use of PRP as a non-surgical treatment option for patients with PDBTR, while describing the successful treatment of a chronic PDBTR with PRP.

Case Description:

This case report presents the treatment of a chronic, PDBTR with the use of platelet rich plasma in a patient who failed conservative therapy and was reluctant to undergo surgery. A single PRP injection was administered at the insertion sight of the distal biceps tendon and the patient was reexamined at two and four weeks post injection.

Outcomes:

Within 2 weeks of the PRP injection the patient reported increased strength with supination and flexion of the elbow, as well as decreased pain when performing these actions. 4 weeks after the injection the patient attained full functional recovery and reported complete resolution of pain shortly thereafter.

Discussion:

Although the use of PRP in treating tendon pathology is increasing in popularity, little research exists to familiarize patients and physicians with the use of PRP in the management of a chronic PDBTR. The course of recovery, from initial injury to complete resolution of symptoms, for an individual with a PDBTR is outlined. Although this case supports PRP injection as an effective, non-surgical means of treating a chronic PDBTR, further research regarding the role of PRP in treating tendon pathology is needed.

Data Source

A PubMed search was performed for studies relating to PRP and Biceps Tendon Injury. Relevant references from these studies were also retrieved.

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Level of Evidence

4-Case Report

Key Words

PRP, platelet, rich, plasma, Distal, Bicep, tendon, rupture

BACKGROUND

Platelet rich plasma (PRP) is an autologous blood product containing a supra-physiologic concentration of platelets. Although the use of PRP in treating tendon pathology is increasing in popularity, the research surrounding its use is still in its infancy and that which exists has produced a wide range of results. Specifically, research surrounding the use of PRP in the management of partial distal biceps tendon ruptures (PDBTR) is scarce. The purpose of this case report is to explore the use of PRP as a non-surgical treatment option for patients with PDBTR, while describing the successful treatment of a chronic PDBTR with PRP.

Distal biceps tendon rupture (DBTR) is a relatively uncommon diagnosis. After analyzing medical records for all members of a population with injuries of the elbow during a 5 year period, an incidence of 1.2 DBTRs per 100,000 patients was reported by Safran.⁽¹⁾ Partial distal bicep tendon ruptures are less commonly diagnosed than complete ruptures.⁽²⁾ This is misleading and does not mean that partial ruptures occur less frequently than complete ruptures. PDBTR are less commonly diagnosed in part due to the subtleness of the signs and symptoms when compared to complete ruptures. Partial ruptures present without a palpable defect in the antecubital fossa and with less supination weakness than is seen with complete rupture. A study by Sutton reported 10% of all bicep tendon ruptures (BTR) occur distally; however, Thompson reported only 3% occur distally.^(3, 29) Regardless of the study being referenced, it is evident the majority of BTR occur at the proximal end of the biceps. DBTR occur more frequently in the male population, with the highest incidence seen between the 4th and 6th decades of life.^(1, 4) The dominant arm was shown to be affected in greater than 85% of DBTR.⁽¹⁾ DBTR are most frequently produced by excessive eccentric contraction of the bicep with the elbow in a flexed position. While a multitude of factors can increase the risk of tendon injury, smoking was shown to markedly increase the risk of injury greater than 7 times that seen in the non-smoking population.⁽¹⁾ In short, research has shown that middle-aged males who smoke are at much higher risk for DBTR than the general population.

Many methods have been described for the treatment of PDBTR; however, there is still debate about the management of choice.⁽⁵⁾ Initial treatment of a PDBTR should be conservative. Traditional conservative therapy consists of rest, immobilization, non-steroidal anti-inflammatories, corticosteroid injections, and physical therapy. If the rupture is complete or "symptoms persist with functional limitations in elbow flexion and supination," research supports considering surgical management.⁽²⁾ Literature discussing chronic PDBTR has supported surgical^(6, 7-10) and non-operative conservative management.^(11, 12) Chronic ruptures are those that present greater than 6 weeks following the onset of injury.⁽²⁾ Unfortunately, the efficacy of traditional conservative treatment options remains in question⁽¹³⁻¹⁷⁾ and surgery

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carries many risks including long recovery periods, high incidence of re-rupture, and wound infection.^(18,19) Until recently, when conservative management failed for a patient unable or unwilling to undergo surgery, there were little other treatment options available. Patients often had to rely on frequent analgesic use and or corticosteroid injections to alleviate their symptoms. Due to the lack of options and questioning of the efficacy of traditional conservative and surgical options, research is now being directed toward PRP as an alternative treatment option for tendon injuries.^(20,21,22)

PRP is a general term used to describe autologous blood products containing varying supra-physiologic concentrations of platelets.^(40,41) Platelets contain many different growth factors and cytokines that promote healing by stimulating cell migration, cell proliferation, and angiogenesis.⁽⁴²⁾ The preparation and administration of all PRP injections involves three basic steps. First blood is withdrawn from the patient. That blood is then centrifuged to separate the plasma rich in platelets from that containing red and white blood cells. Finally, the platelet rich plasma is injected into the injured tissue.⁽⁴³⁾ This biologic healing concept is highly attractive because it uses the patient's own blood thereby significantly reducing the risk of disease transmission. Supporting the use of PRP scientifically has been difficult due to the variability between each PRP preparation. The authors of a systemic review evaluating clinical outcomes following PRP intervention of orthopedic injuries concluded; the greatest barrier to evaluating PRP as a treatment option is the lack of standardization in preparation.⁽⁴⁴⁾ Many PRP-producing devices have been manufactured and are available commercially, but each has a different technique for preparing PRP. PRP preparations can vary in many ways including: the amount of blood withdrawn, frequency and speed of centrifugation, the use of an activating agent (thrombin, collagen, and calcium), presence of leukocytes, time from withdrawal to injection, method of storage prior to injection, exact location of injection, and final amount injected. As one study reported the concentration of platelets in PRP varies between 2.5 and 8.0 times that in whole blood.⁽⁴⁵⁾ Further investigation is needed to attain the optimal preparation and dosage of PRP.

PRP has been used clinically since the 1970's and today is utilized by a wide variety of medical specialists. Only recently, in the 1990s, has PRP become an increasingly popular treatment option for tendon injury.⁽²³⁾ PRP has shown its greatest efficacy in treating epicondylitis of the elbow.⁽²⁴⁾ Multiple studies have demonstrated PRP is significantly more effective than corticosteroid injections at alleviating the pain and loss of function associated with epicondylitis.^(25,26) Further research is needed to determine whether the same PRP-related benefits seen in the treatment of epicondylitis can be reproduced in patients with DBTR. Literature discussing the use of PRP as the primary intervention for PDBTR is lacking. This Case study aims to familiarize physicians with the use of PRP as well as describe the successful treatment of a PDBTR with the use of PRP.

Case Description:

Patient Demographics

The patient was a 48-year-old male physician who, prior to his injury, enjoyed participating in light resistance exercise three times per week and non-vigorous tennis once a week. He had a significant past medical history of lateral epicondylitis of the right elbow in 2007 which was

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treated with prolotherapy. Specifically, ten shots of twenty percent dextrose was administered over the lateral epicondyle with complete recovery and no recurrence of symptoms to this date. He denied the use of any medications at the time of injury and or supplementation to aid his exercise performance. He denied ever using tobacco or alcohol.

Injury Onset and Medical Diagnosis

The patient injured his right elbow in April 2013 while removing luggage from the roof-rack of his car. Initially he felt mild sharp pain over the anterior aspect of his R elbow. He managed the pain with stretching, avoidance of aggravating activities, and topical non-steroidal anti-inflammatory gel. Due to the pain increasing in severity and frequency he met with an orthopedist in July to discuss further treatment. At this time a magnetic resonance imaging (MRI) scan without contrast (Optima MR450w 1.5T) was performed. MRI is the definitive test to confirm the severity of a suspected PDBTR. Ultrasound may be helpful in diagnosing a PDBTR, but it is difficult and less accurate due to the curved course of the distal segment.⁽²⁷⁾ The MRI scan indicated a partial thickness tear involving 50% of the right biceps tendon and tendinosis of the distal biceps tendon with mild bicipitoradial bursitis (figure 1). After reviewing the treatment options the patient decided to undergo PRP injection therapy.



Figure 1: MRI sagittal and axial T2 images of partially torn biceps tendon with a small amount of fluid in the bicipitoradial bursa.

INITIAL EXAMINATION

Subjective

The patient presented to the orthopedic clinic in July of 2013 complaining of intermittent, sharp, non-radiating pain over the anterior aspect of his right elbow, specifically in the distal lateral portion of the antecubital fossa. A numerical pain rating scale (NPRS) with 0 (no pain) to 10 (worst pain imaginable) was used to objectively assess the patient's level of pain.^(28,29) The pain varied in severity from 0/10 to 5/10 and was dependent on position and activity of the right upper extremity. The pain had been increasing in severity and frequency since April 2013 when he injured the arm while unloading luggage from the top of his motor vehicle.

The initial pain was sharp, focal, and over the anterior elbow. It was felt while decelerating the suitcase with his right arm just before it made contact with the ground. He estimated the heaviest

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piece of luggage to weigh 60lbs. The pain was bearable and he continued unloading the rest of the luggage. The pain became worse with each subsequent suitcase he unloaded even though the remaining pieces of luggage weighed less than that which caused the initial injury. During the 6 weeks following, the pain was 2/10 and elicited by lifting weights greater than 20lbs that required activation of his biceps muscle. The same pain was also felt while maximally flexing the elbow without resistance. The patient could recreate the pain via deep palpation over the radial tuberosity. He initially managed the pain by stretching, limiting right upper extremity motion, and avoiding aggravating activities.

In June, the pain gradually increased in severity to 4/10 while lifting weight less than 10lbs. Although he attempted to avoid activities that triggered the pain, it was difficult for him to do so especially around the work place. His work required him to carry a laptop and perform physical examinations on his patients, both of which caused him pain. The patient, believing the pain was caused by tendonitis, began applying a topical non-steroidal anti-inflammatory agent in addition to his conservative management regimen. These measures provided minimal relief.

In July, the patient's pain became nearly constant. It was felt with the elbow in flexion as well as extension. The pain was worsened by minimal activities, especially those involving supination of the forearm, such as turning a door handle. At this time the pain was rated 5/10. Because he was right side dominant, the pain was interfering with his ability to perform his duties at work. This prompted the patient to visit a board certified orthopedist in August to discuss further treatment options.

The patient's goal was to become pain free and regain full pre-injury function of the right upper extremity. In particular, he wanted to be able to hold his laptop in his flexed right arm, perform a physical exam, and open doors without feeling pain.

Observation and Structural Inspection

The patient was a well-nourished male appearing as stated age and in no apparent distress. The patient denied any constitutional signs or symptoms. Height: 170cm. Body Mass: 79kg. BMI: 25.1 kg/m². No swelling, bruising, or erythema noted. A normal 15 degree carrying angle was noted symmetrically in his upper extremities.

Palpation

The distal 10cm of his biceps and his radial tuberosity were mildly tender. Posterior palpation of the radial tuberosity was equivocally tender. The olecranon tip was non-tender to palpation (NTTP). The Triceps tendon was NTTP. Forced passive extension of the elbow was equivocally tender. Forced passive flexion was slightly tender. There was no definitive contour change of the distal biceps itself. No swelling was noted over the right upper extremity. Radiocapitellar joint restriction was negative. The medial right elbow was NTTP. Percussion over the ulnar nerve was negative for radicular symptoms and tenderness. Ulnar nerve flexion test was within normal limits. The wrist was NTTP throughout. The wrist range of motion was full. The right shoulder

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was NTTP throughout. The elbow flexion crease was negative for deformity. Muscle-tendon junction was negative for deformity. Proximal biceps area was negative for deformity.

Range of Motion

The patients range of motion (ROM) was tested in bilateral upper extremities as described by White.⁽³⁰⁾ Passive(PROM) and active range of motion (AROM) of right elbow extension were within normal limits (WNL) at 180 degrees. PROM and AROM of right elbow flexion was WNL at 140 degrees with moderate pain between 110-140 degrees of motion. AROM and PROM in bilateral wrists were WNL, although moderate pain was felt over the antecubital fossa at the limits of supination of the right wrist. AROM and PROM in bilateral shoulders were WNL in abduction, adduction, flexion, Extension, internal and external rotation.

Strength

Strength of the upper extremities was objectively measured (Table 1) using active muscle testing as described by Montgomery.⁽³¹⁾

	Pre[PRP]		2 weeks Post Injection		4-weeks	
Muscle Groups Tested	Right	Left	Right	Left	Right	Left
<i>Shoulder Internal Rotation</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Shoulder External Rotation</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Shoulder Flexion</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Elbow flexion</i>	3/5	5/5	4/5	5/5	5/5	5/5
<i>Elbow Extension</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Wrist Flexion</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Wrist Extension</i>	5/5	5/5	5/5	5/5	5/5	5/5
<i>Forearm Supination</i>	3/5	5/5	4/5	5/5	5/5	5/5
<i>Forearm Pronation</i>	5/5	5/5	5/5	5/5	5/5	5/5

Table 1 *PRP: Platelet rich plasma.

Testing Prior to PRP Injection, 2-weeks Following, and 4-weeks Following PRP Injection.

Special Testing

Two special tests, The Squeeze test and the Hook test were used in the evaluation of the patient. The Squeeze test, involves squeezing the muscle belly of the biceps brachii in attempt to elicit supination at the wrist. A positive result is recorded if no supination occurs. It has a reported sensitivity of 0.96 in making the diagnosis of complete DBTR.⁽³⁴⁾ This test was negative in our patient. The Hook test, involves the examiner hooking his or her index finger under the distal biceps tendon while the subject actively supinates the forearm. A positive result is recorded if at any point there is an absence of cord-like structure able to be hooked by the examiners index finger. This test has a reported sensitivity of 1.0 and specificity of 1.0 in diagnosing a complete DBTR.⁽³³⁾ This test was also negative in our patient. Later, an MRI demonstrating only a partial tear of the biceps tendon, confirmed the results of both tests.

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Assessment and Evaluation

12-weeks after injuring his right elbow the patient presented to an orthopedist for examination. At this time the patient had obvious weakness of his right upper extremity due to a partial distal bicep tendon tear. Eccentric contraction of the biceps, the mechanism of injury in this case, is consistent with the most common mechanism for injuring the distal biceps tendon.⁽³⁵⁻³⁹⁾ The functional limitations due to weakness in supination and flexion of the elbow were also consistent with a partially torn distal bicep tendon.⁽²⁾ After examination and discussion of the possible treatment options the patient elected to undergo PRP injection therapy and continue his conservative management at home.

INTERVENTION PLAN & PRP PREPERATION

In September 2013, a single PRP injection was administered directly at the insertion sight of the distal biceps tendon. Informed consent was obtained from the patient. 10ml of Anticoagulant Sodium Citrate was drawn into a 60ml syringe. 50ml of whole blood was harvested aseptically from the left cephalic vein into the same 60ml syringe. The anticoagulated whole blood was loaded into a concentrating tube. The concentrating tube was then centrifuged with an appropriate counterbalance at 3800rpm for 1.5 minutes. The concentrating device was removed from the centrifuge. The superior layer platelet plasma suspension was aspirated from the device leaving behind the inferior layer of red blood cells (RBC). This platelet plasma suspension was transferred to a separate concentrating tube and centrifuged with appropriate counterbalance at 3800rpm for 5 minutes. This step effectively separates the majority of platelets from the platelet poor plasma. Next the superior layer of platelet poor plasma was aspirated from the concentrating device leaving behind 7ml of plasma including the inferior layer platelet concentrate buffycoat. A 12ml syringe was attached to the concentrating tube and swirled by hand for 15 seconds to resuspend the platelet buffycoat into the plasma. The time between whole blood draw and injection was less than 15minutes. Appropriate landmarks were noted about the right elbow. His greatest pain was along the lateral border of the biceps tendon at the insertion on the radial tuberosity. This area was marked carefully. After prepping the anterior elbow aseptically 7ml of PRP was injected into the radial tuberosity bursa, at the base of the biceps tendon attachment. Following the injection a hinged elbow brace locked at 90 degrees of flexion was placed on the affected arm and worn for the next 2 weeks.

OUTCOMES

Follow-up (2 weeks)

The patient reported experiencing slightly increased soreness in the antecubital fossa for 5days following the injection. At 2-Weeks post-PRP injection the patient was reexamined. According to the patient pain over the insertion sight of the distal biceps tendon had decreased to a 2/10. The patient stated increased strength and a 50% increase in functionality of his right upper extremity since the injection. Upon palpation of the radial tuberosity the patient reported minimal tenderness when compared to that felt prior to the injection. The patient's strength was

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objectively tested and scores for flexion and supination had increased to 4/5 from the pre-injection scores of 3/5.

Follow-up (4 weeks)

At 4-weeks post-PRP injection the patient was again reexamined and reported to have mild occasional pain with activity but complete functional recovery. Explaining he could now turn door handles, carry his laptop in his flexed right arm, and perform a physical examination as he could prior to the injury. The patient reported using the sling on and off throughout the third, post-injection week. The patient also reported flexing and supinating his right arm while holding 5-10lb books with minimal pain and weakness during this time. The patient slowly increased the weight of these books throughout the third and fourth weeks following the injection. Since the two week visit the patient reported further decrease in pain over the distal bicep tendon insertion and rated this pain a 1/10. At this visit the patient stated he had recovered full pre-injury strength. On examination tenderness to palpation was still noted over the radial tuberosity; however, the patient reported this to have decreased since the 2-week visit. The patients strength was objectively tested again and scores for flexion and supination had increased to 5/5 from the scores two weeks prior of 4/5. No difference in strength was noted when compared to the unaffected extremity.

Subjective follow-up (8 months)

8 months post-PRP injection, the patient reported complete resolution of the minimal pain present during the 4-week follow up and no recurrence of pain regardless of position or activity since the injection. He also reported that he has maintained full pre-injury function and strength.

Subjective follow-up (1 year)

12 months post-PRP injection, the patient reported continued relief minimal pain present during the 4-week follow up and no recurrence of pain regardless of position or activity since the injection. He also reported that he has continued to maintain full pre-injury function and strength.

DISCUSSION

This case report outlined the recovery course for an individual with a PDBTR, who fits the average age, gender, and injury mechanism for distal biceps tendon rupture.^(1,4) This individual had been dealing with worsening pain and decreased function of his right upper extremity for roughly three months prior to seeking help in a clinical setting. During this time his symptoms worsened despite this individual's efforts to manage his injury with traditional conservative measures. After meeting with an orthopedist the individual, reluctant to undergo surgery, elected to undergo PRP injection.

Many studies surrounding the use of PRP in treating tendon injuries have found significant improvements in a variety of outcome measures.^(46,18, 26) However, few of these studies specifically address the treatment of DBTR with PRP. The majority of research discussing

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treatment options for patients with DBTR, revolve around traditional conservative and surgical means. Conservative management should always be tried first; however, studies have shown that this is often insufficient for treating partial tears. One study that looked at 20 DTBR found that after conservative management the power of flexion and supination remained significantly reduced.⁽⁴⁷⁾ Surgery has been shown to be the most beneficial in treating PDBTR; however, as with any surgery there is a myriad of possible complications associated with it. The patient in this case report was reluctant to undergo surgery and even if he wasn't, he would not be an ideal candidate due to the chronic nature of his injury. Chronic tendon tears are more difficult to treat surgically because of possible tendon retraction and poor tissue quality.⁽²⁾

Prior to the advent of PRP, patients in this situation were left with few options to manage their injury. PRP offers an additional, promising treatment option to patients, similar to the one in this case, who have failed conservative therapy and are seeking further non-surgical treatment. Unfortunately, the research investigating PRP as a treatment option for musculoskeletal injuries has yielded inconsistent, incomparable results. The main reason that results from PRP related studies vary is that the composition of PRP preparations used in each of the studies varies. In order for the results of PRP-related studies to be compared a standardized way of preparing PRP must be established. A recent systemic review regarding the use of PRP in orthopedic related injuries concluded, that the most significant barrier to critically evaluating the efficacy of PRP is the lack of standardization in preparation and dosage.⁽⁴⁸⁾

There are limitations to consider when analyzing the outcome of this case report. The successful recovery of the patient in this case report may have been due to the PRP injection which is believed to promote healing by stimulating cell migration, cell proliferation, and angiogenesis.⁽⁴²⁾ The goal of the treatment was to eliminate pain and facilitate full functional recovery in the patient. Although these results were achieved within one month following the injection, it is not certain that the PRP injection was the reason for recovery. After visiting the orthopedist the patient had multiple variables added to his treatment regimen in addition to the PRP injection. For instance, following the injection a sling was used for the first time since the injury. It could be theorized that this facilitated additional resting of the elbow not possible prior to the injection. The other major limitation is that the exact type and concentration of growth factors, cytokines, and platelets present in the PRP injection is unknown.

CONCLUSION

The research surrounding the use of PRP is still emerging and that which exists has yielded inconsistent results. PRP may be an underutilized safe and effective, means of treating PDBTR in patients who fail traditional conservative therapy and are seeking further non-surgical treatment. Due to the rarity of the injury and the recent gain in popularity of PRP, there is little research regarding the management of PDBTR with PRP. Although this case report describes the successful treatment of a PDBTR with the use of PRP, the outcomes of this case need to be compared to other similar studies in order to draw any substantial conclusions about the efficacy of PRP in treating PDBTR. Unfortunately there is a lack of consistent nomenclature for PRP products and no agreement on a standardized PRP preparation has been established. Further

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research is needed to develop a standardized PRP preparation so that the outcomes of future studies regarding the use of PRP in the treatment of PDBTR can be analyzed.

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PRIVACY AND CONFIDENTIALITY:

No patients had their identity revealed or had their privacy breached during this case report.

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