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| **CRITICALLY APPRAISED TOPIC** |

**FOCUSED CLINICAL QUESTION**

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| For a 35 year old obese female with chronic plantar fasciitis, would platelet rich plasma or corticosteroid injections produce better short/long term pain relief? |

**AUTHOR**

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| **Prepared by** | Bart Satterfield | **Date** | November 2017  |
| **Email address** | barts@med.unc.edu |

**CLINICAL SCENARIO**

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| The patient was a 35 year old female that had been dealing with plantar fasciitis for ~5 months which caused her to have constant 5-7/10 pain (9/10 at its worst). She was previously treated with standard therapy (RICE, NSAIDs, stretching, mobilizations, and strengthening) with little to no pain relief. She was frustrated with therapy and wanted to speak with a podiatrist in regards to undergoing a plantar release procedure. This procedure may not be the best option due to its association with a number of risks. Cadaveric studies have shown that this procedure reduces arch stiffness by 25%, alters forefoot loading, increases load on the second metatarsal, significantly changes joint position that can lead to further deterioration, and increases the strain exerted on the calcaneocuboid ligament and joint capsule1–4. This procedure usually leaves 10-50% of patients unsatisfied and can result in more severe symptoms and persisting pain5. With this being known, this procedure should only be used as a last resort. The use of platelet rich plasma or corticosteroid injections may provide effective pain relief in patients with recalcitrant plantar fasciitis to avoid the need for this procedure. These injections are also minimally invasive.  |

**SUMMARY OF SEARCH**

[Best evidence appraised and key findings]

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| The majority of the evidence on this subject consists of prospective clinical studies that compare the outcomes of platelet rich plasma (PRP) versus corticosteroid directly. Since corticosteroids are typically utilized when patients have not responded to conservative treatment, these comparative studies are effective at demonstrating that PRP is another alternative that improves function and pain. From this search, only one randomized controlled trial was found. To further validate these findings, more RCTs are needed to prove that the improvement was caused by the treatment and not by the patient spontaneously recovering with time. More longitudinal studies are also needed to determine if there are any adverse effects associated with the use of PRP. Corticosteroids already have a documented history of disrupting collagen structure, which can result in a rupture. A systematic review was performed, using the included studies, and found PRP to be a good alternative but most of these studies were not randomized or blinded. The studies used different methods of preparing the PRP such as: varying centrifuge time and rounds per minute, the use of activation agents and buffers, altering leukocyte amount, and varying the volume injected into the plantar fascia. Studies also varied in their administration technique: peppering technique versus medical approach. Future studies should work to standardize the preparation method for PRP. The results are promising, however the overall quality of evidence is low to moderate at this time, for reasons previously mentioned. |

**CLINICAL BOTTOM LINE**

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| Both PRP and corticosteroid injections improve function and pain in patients with recalcitrant plantar fasciitis. PRP seem to be more effective at improving short-term pain but there is not a significant difference between the two in regards to function. More high quality studies are needed to demonstrate the long-term effects of these injections. Since PRP injections are comprised of plates and growth factors from the patient’s blood, it may be safer long term. Corticosteroids destroys collagen, which increases risk for further damages6.  |

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| ***This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor*** |

**SEARCH STRATEGY**

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| **Terms used to guide the search strategy** |
| **P**atient/Client Group | **I**ntervention (or Assessment) | **C**omparison | **O**utcome(s) |
| Plantar fasci\*Heel painPlantar heel | Platelet rich plasma | Corticosteriod\*Steroid\*Adrenal cortex Hormone\*Adrenocortical | Pain |

**Final search strategy (history):**

1. Plantar fascia\* OR heel pain OR plantar heel
2. Platelet rich plasma
3. Corticosteroid\* OR steroid\* OR adrenal cortex hormone\* OR adrenocortical
4. Pain
5. #1 AND #2 AND #3 AND #4
6. Plantar fascia\* OR heel pain OR plantar heel [MeSH Major Topic]
7. Platelet rich plasma [Title/Abstract]
8. Corticosteroid\* OR steroid\* OR adrenal cortex hormone\* OR adrenocortical [Title/Abstract]
9. Pain [Title/Abstract]
10. #6 AND #7 AND #8 AND #9
11. #6 AND #7 AND #8 AND #9 Filters: published in the last 10 years
12. #6 AND #7 AND #8 AND #9 Filters: clinical trial; published in the last 10 years
13. #6 AND #7 AND #8 AND #9 Filters: clinical trial; Review; published in the last 10 years
14. #6 AND #7 AND #8 AND #9 Filters: clinical trial; Review; symmetric review; published in the last 10 years
15. #6 AND #7 AND #8 AND #9 Filters: clinical trial; Review; symmetric review; meta-analysis; published in the last 10 years

Final pubmed search:((((Plantar fasci\* OR heel pain OR plantar heel[MeSH Major Topic])) AND Platelet rich plasma[Title/Abstract]) AND (Corticosteroid\*[Title/Abstract] OR steroid\*[Title/Abstract] OR adrenal cortex hormone\*[Title/Abstract] OR adrenocortical[Title/Abstract])) AND pain[Title/Abstract]

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| **Databases and Sites Searched** | **Number of results** | **Limits applied, revised number of results (if applicable)** |
| **PubMed****Web Of Science****CINAHL****Cochrane** | **19****27****9****10** | **-Clinical trials, metal-analysis, RCTs, Systematic reviews (14 articles)****-Articles with corticosteroid (or variations) and platelet rich plasma in the title (6 articles)** |

## INCLUSION and EXCLUSION CRITERIA

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| **Inclusion Criteria** |
| * Chronic symptoms (>3 months or failed conservative treatment)
* Randomized control trials
* Clinical trials
* Systematic reviews
* Meta-analysis
* Published in English
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| **Exclusion Criteria** |
| * Case reports
* Articles prior to 2007
* Subject size <30
* Abstracts
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**RESULTS OF SEARCH**

**Summary of articles retrieved that met inclusion and exclusion criteria**

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| **Author (Year)** | **Risk of bias (quality score)\*** | **Level of Evidence\*\*** | **Relevance** | **Study design** |
| **Singh (2007)**7 | **AMSTAR: 9/11** | **Level 1b** | **High** | **Systematic Review** |
| **Mahindra (2016)**8 | **PEDro Score: 10/10^** | **Level 1b** | **High** | **Prospective, Randomized Controlled Trial** |
| **Jain (2015)**9 | **PEDro Score: 8/10^** | **Level 1c** | **High** | **Prospective, Randomized Clinical Trial** |
| **Monto (2014)**10 | **PEDro Score: 9/10^** | **Level 1c** | **High** | **Prospective, Randomized Clinical Trial** |
| **Sherpy (2016)**11 | **PEDro Score: 9/10^** | **Level 1c** | **High** | **Prospective, Randomized Clinical Trial** |
| **Say (2014)**12 | **Downs and Black Checklist: 16/26^^** | **Level 2b** | **High** | **Prospective, Non-Randomized Study** |
| **Shetty (2014)** | **Downs and Black Checklist: 18/26^^** | **Level 2b** | **High** | **Prospective, Non-Randomized Study** |
| **Aksahin (2012)** | **Downs and Black Checklist: 18/26^^** | **Level 2b** | **High** | **Prospective, Non-Randomized Study** |

^Scoring does not include therapist-administered therapy

^^Scoring does not include power analysis

\*Indicate tool name and score

\*\*Use Portney & Watkins Table 16.1 (2009); if downgraded, indicate reason why

**BEST EVIDENCE**

The following 2 studies were identified as the ‘best’ evidence and selected for critical appraisal. Rationale for selecting these studies were:

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| * **Mahindra (2016)-This is the only randomized controlled trial that was found during the search. It has an extremely low risk of bias as evidenced by the PEDro scale and has a sample size that is larger than most of the other studies (25 subjects in each group). This study uses both the VAS score and the AOFAS, which effectively evaluates the entirety of the subjects’ change and presentation.**
* **Singh (2017)-This is a systematic review and meta-analysis that includes most of the articles that were reviewed. It has a low risk of bias as determined by the AMSTAR tool.**
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**SUMMARY OF BEST EVIDENCE**

**(1) Description and appraisal of Chronic Plantar Fasciitis: Effect of Platelet-Rich plasma, Corticosteroid, and Placebo by Mahindra P, Yamin M, Selhi HS, Singla S, and Soni A (2016)**

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| **Aim/Objective of the Study/Systematic Review:** |
| This study examines the effects that corticosteroids, platelet rich plasma, and placebo injections have on individuals with chronic plantar fasciitis. |
| **Study Design**[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]Note: For systematic review, use headings ‘search strategy’, ‘selection criteria’, ‘methods’ etc. For qualitative studies, identify data collection/analyses methods. |
| * A double blinded, randomized controlled trial
* **Eligibility Criteria**: Individuals that did not respond to at least 3 months of standardized plantar fasciitis treatment, which included physical therapy, bracing, orthotics, and NSAIDs. Plantar fasciitis was diagnosed by a physical examination and their subjective history.
* **Allocation**: Authors randomized participants into 3 groups with the use of a computer derived random charts. Groups included a platelet rich plasma group (group A), corticosteroid group (group B), and saline group (group C).
* **Intervention**: Group A was injected with 2.5-3mL of PRP, group B was injected with 2mL of corticosteroids, and group C was injected with unknown amount of saline.
* **Data** **Collection**: Patient assessments were made at baseline, at 3 weeks, and 3 months by a blinded investigator.
* **Statistical Methods**: All of the data collected during the assessments was paired with a 2 tailed Student’s t test. P<.05 was considered significant.
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| **Setting**[e.g., locations such as hospital, community; rural; metropolitan; country] |
| * Not explicitly stated but is presumed to be in a hospital setting because of the authors association with medical colleges with hospitals.
* Ludhiana, India and Faridkot, India
 |
| **Participants**[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article. |
| * The study included 75 individuals, 25 in each group, which met the eligibility criteria previously stated.
* Authors did not report their method of recruitment.
* PRP group had an average age of 30.7 (SD, 7.4) with 8 men and 17 women.
* Corticosteroid group had an average age of 33.9 (SD, 8.6) with 12 men and 13 women.
* Saline group had an average age of 35.5 (SD, 9.5) with 11 men and 14 women.
* There were not significant differences between the groups’ characteristics, VAS, or AOFAS scores at baseline.
* Authors did not provide any further characteristics on the individuals involved in the study.
* Data was collected on all subjects that participated in the study.
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| **Intervention Investigated**[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided] |
| *Control* |
| * Group C (25 individuals) was injected with an unknown amount of saline at the site of maximum tenderness with a 22g needle using a peppering technique.
* For blinding purposes, group C also had blood drawn and the injections was administered by an investigator that was not involved in the assessment process.
* Subjects were not allowed to use NSAIDs 1 week prior to study and were instructed not to use NSAIDs for 1 month following the injection.
* Subjects were given a stretching program that was focused on the plantar fascia and calf musculature.
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| *Experimental* |
| * For the group A (25 individuals), 27 mL of blood was withdrawn form the cubital vein and placed a tube that contained 3 mL of citrate dextrose solution, which was used to prevent blood clots. This blood was then centrifuged for 12 minutes at at 3200 rmp and 2.5-3 mL of platelet rich plasma was collected. Investigators did not use any activation agents. Group B (25 individuals) was injected with 2 mL of 40mg of methylprednisolone. Subjects in both groups were injected at the site of maximum tenderness using a 22g needle using the peppering technique.
* For blinding purposes, group B also had blood drawn and the injections was administered by an investigator that did not perform any of the assessments.
* Subjects were not allowed to use NSAIDs 1 week prior to study and were instructed not to use NSAIDs for 1 month following the procedure.
* Subjects were given a stretching program that was focused on the plantar fascia and calf musculature.
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| **Outcome Measures**[Give details of each measure, maximum possible score and range for each measure, administered by whom, where] |
| * **Visual Analog Scale (VAS) for Pain**
* A unidimensional measure of pain that uses a continuum of values to rate pain from none to worse possible pain24. This spectrum allows user to rate their pain without using categories24. Score is made by measuring the distance, using mm, between the no pain line to the patient’s mark. The longer the distance, the worse the pain.
* MCID 30.0mm on a 100.0 mm scale or 3/1013
* **Orthopaedic Foot and Ankle Society (AOFAS) Ankle and Hindfoot Scale**
* This outcome measure assesses the ankle using both a patient report (subjective) and clinician report (objective) sections14. AOFAS is comprised of 3 sections that include pain (40 points), function (50 points), and alignment (10 points). Measure is scored out of 100 points and higher the score the less impairment/pain.
* MCID 7.915
* Patients were assessed at baseline, at 3 weeks, and at 3 months post injection by a blinded investigator.
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| **Main Findings**[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.] |
| * At baseline: Mean VAS: group A 7.44 [95% CI, 7.85-7.03], group B 7.72 [95% CI, 8.18-7.26], group C 7.56 [95% CI, 8.01-7.11]. Mean AOFAS: group A 51.56 [95% CI, 55.91-47.21], group B 55.72 [95% CI, 60.34-51.10], group C 50.28 [95% CI, 54.60-45.96]. All of the subjects were similar at baseline
* At 3 weeks: Mean VAS: group A 3.76 [95% CI, 4.36 -3.16], group B 2.84 [95% CI, 3.41-2.27], group C 7.12 [95% CI, 7.56-6.68]. Mean AOFAS: group A 83.92 [95% CI, 88.67-79.17], group B 86.6 [95% CI,89.25-83.95], group C 53.88 [95% CI, 58.51-58.51-49.25]. Mean VAS difference between group A and B: .92 [95% CI, 1.75-.09]. Mean AOFAS difference between group A and B: -2.68 [95% CI, 2.76-(-8.12)]
* At 3 months: Mean VAS: group A 2.52 [95% CI, 3.19-1.85], group B 3.64 [95% CI, 4.28-3.0], group C 3.64 [95% CI, 4.28-3.0]. Mean AOFAS: group A 88.32 [95% CI, 91.67-84.81], group B 81.32 [95% CI, 83.82-78.82], group C 50.84 [95% CI, 55.06-46.62]. Mean VAS difference between group A and B: 1.12 [95% CI, 2.04-.20]. Mean AOFAS difference between group A and B: 6.92 [95% CI, 11.17-2.67]
* Group A and B demonstrated significant improvements in both VAS (p=.00) and AOFAS (p=.00) scores at 3 weeks and 3 months. Group C did not have any significant improvements in VAS at 3 weeks (p=.11) or 3 months (p=.41) and AOFAS at 3 weeks (p=.06) or 3 months (p=.39).
* At 3 weeks, group B had greater improvements in both VAS and AOFAS compared to the group A but these findings were not significant, (p=.35) and (p=.33) respectively.
* At 3 months, there was not a significant difference in VAS score between group A and B (p=.22), however group A had a significantly higher AOFAS score (p=.00).
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| **Original Authors’ Conclusions**[Paraphrase as required. If providing a direct quote, add page number] |
| * Authors concluded that both PRP and corticosteroid injections are effective at improving pain and physical function in patients at 3 weeks and 3 months. There were no improvements in the placebo group. Both groups had similar outcomes in their VAS score but the PRP brought significantly improved AOFAS scores at 3 months. “Platelet rich plasma injection is effective as or more effective than corticosteroid injection” (p. 289).
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| **Critical Appraisal** |
| **Validity**[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.] |
| * PEDro Scale Score: 10/10 based on eligibility criteria: Yes; Random Allocation: Yes; Concealed Allocation: Yes; Baseline comparison: Yes; Blinding of subjects: Yes; Blinding of assessors/investigators: Yes; >85% participant outcomes: Yes; Intention to treat analysis: Yes; Between group comparison: Yes; Point measures: Yes. (Scoring does not include therapist-administered therapy because it does not apply to study).
* Significant strengths of this study are its double blind setup, randomization, and its inclusion of a control group. This is the only related study that compared PRP and corticosteroids against a placebo. This further validates these findings because they are not due to the subjects spontaneously recovering over time.
* Assessments were made with a blinded observer, a screen was used so the subjects could not see the content of the injection they were receiving, blood was drawn from all subjects, and the injections were administered by an investigator that was not involved in the assessments.
* Using both the VAS and AOFAS outcome measures provides a clear picture of the subjects’ presentation and the effects that the interventions had on their pain and overall function.
* A limitation of this study is that the authors only inform the reader of the subjects’ age and gender. The severity of plantar fasciitis is influenced by a number of factors such as obesity, job occupation, excessive pronation, reduced ankle dorsiflexion, and activity level16. Knowing more of these factors would help us better apply these finding to our patients.
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| **Interpretation of Results**[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.] |
| * Currently, this is the best study that truly validates the effects of corticosteroid and PRP injections by having a placebo group. This is a high quality study that has a very low risk of bias as evidenced by the PEDro scale. Authors took every possible step to ensure blinding and also noted results found from similar studies. When comparing PRP injections versus corticosteroid injections, these results indicate that PRP injections have similar pain outcomes and a significant improve in function over corticosteroid injections.
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| **Applicability of Study Results**[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.] |
| * The majority of the subjects in this study were female and the average age of the participants was 33.37 years old. This is close to the age of the patient in the scenario. The study did not provide much information on the characteristics of their subjects so readers can only generalize these findings to patients that have failed conservative treatment for at least 3 months, have moderate-severe pain, and that are between the ages of 23.3-45.02 years old. The lack of information limits our ability to apply these findings to specific patients. The study addressed the benefits that PRP injections and corticosteroid injections have on pain and function in the short term, however it does not address their long-term outcomes. With this being unknown, it only answers half of the PICO question. The results from this study demonstrate that both injections are effective at improving pain and function but it would be better to receive the PRP injection because of the significant improvement in function at 3 months.
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**(2) Description and appraisal of A systematic review and meta-analysis of platelet-rich plasma versus corticosteroid injections for plantar fasciopathy by Singh P, Madanipour S, Bhamra JS, Gill I, (2017)**

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| **Aim/Objective of the Study/Systematic Review:** |
| The purpose of this meta-analysis is to determine whether platelet rich plasma or corticosteroid injections were associated with greater outcomes in function and pain in those with recalcitrant plantar fasciitis. |
| **Study Design**[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]Note: For systematic review, use headings ‘search strategy’, ‘selection criteria’, ‘methods’ etc. For qualitative studies, identify data collection/analyses methods. |
| * The study is a meta-analysis of prospective, randomized and non-randomized studies of patients treated with platelet rich plasma injections and corticosteroid injections to improve pain and function in subjects with recalcitrant plantar fasciitis.

**Search Strategy**: The literature search was performed using PubMed, MEDLINE, EMBASE, and Ovid databases. Search was performed on September 22, 2016 and included articles that were published between January 2000 and September 2016. The search used the key words: “platelet rich plasma”, PRP, “plantar fasciitis”, steroids, “plantar fasciopathy”, “quality of life”, corticosteroids, “injection”, and “visual analogue score”. These terms were used in various combinations and the related articles function in PubMed was utilized to broaden the search**.** Authors also performed a manual search through all of the references.* **Selection Criteria**: There were no language limitations on studies.
* Inclusion:
* Studies that compared the use of PRP injections with corticosteroid injections in patients with chronic plantar fasciopathy
* Randomized controlled trials, prospective observational or retrospective study
* Patients without history of surgical intervention for their plantar fasciopathy
* Studies that included data on at least one validated pain or quality of life scores
* Studies that had at least 10 patients in each intervention.
* Exclusion:
* Studies that did not provide data on pain or quality of life score
* Studies that included subjects with systemic disease
* Case reports, abstracts, reviews, or letters
* Subjects in study with a history of surgical intervention or injections for plantar fasciopathy
* **Data Collection**: Two investigators independently searched for articles that met the inclusion criteria and collected data for the outcomes. Any discrepancies between outcome extractions were settled by performing a re-examination of the study until a consensus was reached.
* **Publication Bias**: Risk of bias was evaluated by the Newcastle Ottawa Scale for non-randomized studies and the Cochrane Collaboration risk of bias tool for randomized studies. Authors also used a funnel plot assess publication bias.
* **Meta-analysis**: Dichotomous variables were compared using odds ratios with 95% confidence intervals by the Mantel-Haenszel method. Odds ratio compared the probably of event occurring in the PRP group versus the corticosteroid group. Continuous variables were compared with the standard mean difference with a 95% confidence interval. If a study did not provide the standard mean difference, this was calculated using a statistical algorithm.
* **Test For Heterogeneity**: Used the chi-square test (X2), with p<.05 determining significance. The I2 method was used to quantify heterogeneity, with <50% being the threshold for low heterogeneity. If significant heterogeneity occurred (I2≥50%), a random effects analysis was performed.
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| **Setting**[e.g., locations such as hospital, community; rural; metropolitan; country] |
| * Not specified but it is presumed to be in a physician’s office or hospital setting.
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| **Participants**[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article. |
| * Meta-analysis included ten studies that included a total of 517 subjects with plantar fasciitis. There were 246 subjects in both platelet rich plasma and corticosteroid groups (one study included a control group (saline) that included 25 subjects).
* Of the ten studies, seven were randomized and the other three were non-randomized. Three studies used radiologic imagining and ultrasound to confirm the diagnosis of plantar fasciitis and five restricted the use of NSAIDs. It is unclear the average age of the participants in both groups. Authors reported “the mean age of included patients in the PRP group ranged from 30.7 to 51.0 years compared with 33.9–59.0 years in the PRP group”.
* PRP group: Four studies involved two centrifugations for preparation and the other six only used one. Five studies used a local anesthetic and three-used calcium based activation agents.
* Corticosteroid group: Five studies used methylprednisolone, three used triamcinolone, and one used dexamethasone.
* All studies included outcomes for quality of life and pain at varying follow up points. All subjects performed a stretching program after their respective injection.
* None of the studies reported any adverse effects caused by the injections.
 |
| **Intervention Investigated**[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided] |
| *Control* |
| * Authors considered the corticosteroid injections as the control since it was typically used when patients did not respond to standard therapy.
* One study included a control group, n=25, that received saline injections.
 |
| *Experimental* |
| * Subjects that received platelet rich plasma injection.
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| **Outcome Measures**[Give details of each measure, maximum possible score and range for each measure, administered by whom, where] |
| **Primary outcomes*** **Visual Analog Scale (VAS) for Pain** (90%)
* A unidimensional measure of pain that uses a continuum of values to rate pain from none to worse possible pain24. This spectrum allows user to rate their pain without using categories24. Score is made by measuring the distance, using mm, between the no pain line to the patient’s mark. The longer the distance, the worse the pain.
* MCID 30.0mm on a 100.0 mm scale or 3/1013
* **Orthopaedic Foot and Ankle Society (AOFAS) Ankle and Hindfoot Scale** (60%)
* This outcome measure assesses the ankle using both a patient report (subjective) and clinician report (objective) sections14. AOFAS is comprised of 3 sections that include pain (40 points), function (50 points), and alignment (10 points). Measure is scored out of 100 points and higher the score, the less impairment/pain14.
* MCID 7.915
* **Foot and Ankle Disability Index (FADI)** (20%)
* The FADI is a patient questionnaire that includes 26 questions that are focused on pain and functional capability17. Questions are scored by on a 5 point Likert scale from 0 (unable to do) to 4 (no difficulty)17. Measure is scored out of 104 points and higher the score, the less impairment/pain.

**Secondary outcomes*** **Roles Maudsley score (RM)** (20%)
* The RM is a short subjective 4 point rating scale that assesses activity limitations and pain18. A score of 1 indicates “no pain, full movement and activity” and a score of 4 indicates “pain limiting activities”19.
* **Foot Health Status Questionnaire (FHSQ) (10%)**
* The FHSQ is a foot specific measure that has 4 sections that include foot function, footwear, foot pain, and general foot health20. There are a total of 13 questions and are scored on 5 point Likert scale with a total score of 10020. The higher scores demonstrate higher quality of life and foot health.

\*Primary outcomes were used in the meta-analysis  |
| **Main Findings**[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.] |
| VAS (90%)* At 1 month: No significant difference between groups (p=.17), -.49 [95% CI, .11-1.15]
* At 3 months: Significant improvement in PRP group (p=.04), -.66 [95% CI,, -1.3-(-.02)]
* At 6 months: No significant difference between group (p=.17), -.67 [95% CI, -1.65-.03]

AOFAS (60%)* At 1 month: No significant difference between groups (p=.44), .61 [95% CI, -.92-2.14]
* At 3 months: Significant improvement in PRP group (p=.03), 1.87 [95% CI, .16- 3.58]
* At 6 months: No significant difference between groups (p=.23), 1.69 [95% CI, -1.06-4.45]
* At 12 months: No significant difference between groups (p=..20) 3.2 [95% CI, -1.64-8.04]

FADI (20%)* At 3 months: No significant difference between groups (p=.27), 1.73 [95% CI, 1.32-4.78]
* The PRP group improved significantly more than the corticosteroid group in VAS and AOFAS outcomes at the 3 month follow up, however there were no significant difference between groups during the other follow ups. Although it was not a significant difference, the PRP injections were favored in regards to the subjects’ VAS score and corticosteroids were favored in the AOFAS and FADI scores. These results demonstrate that the PRP and corticosteroids produce similar outcomes in both pain and function outcomes, with PRP having better outcomes at 3 months.

\*% represents the % of included studies that used the particular outcome measure. |
| **Original Authors’ Conclusions**[Paraphrase as required. If providing a direct quote, add page number] |
| * PRP injections resulted in greater function and pain outcomes at 3 months, however the results between both groups were not significantly different during the long-term follow-ups. The current literature is lacking high quality studies that compare the long-term effects of both injections.
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| **Critical Appraisal** |
| **Validity**[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.] |
| * AMSTAR score: 9/11 Priori design provided: Yes; Two independent data extractors: Yes; Comprehensive search: Yes; Status of publication: No; List of studies: No; Characteristics of studies: Yes; Quality of studies noted: Yes; Quality of studies used in conclusions: Yes; Appropriate methods: Yes; Publication bias assessed: Yes; Conflict of interest noted: Yes.
* Strengths: Authors assessed the quality of each study using validated measures and included a chart detailing these findings. This meta-analysis included all of the studies that were reviewed for the PICO question. Authors used a funnel plot to determine if there was any publication bias. There was significant heterogeneity in the preparation of PRP and type of steroid administered between studies so authors performed a random effects analysis.
* Weaknesses: Authors provided a flow chart that detailed their screening process but did not include the list of studies that were excluded from this meta-analysis. Authors also did not search for unpublished studies. Both of these factors are potentials for publication bias. Half of the included articles were not blinded and only three were double blinded so the included studies have a high risk of reporting bias. Only one of the articles included a placebo, which truly validates that the improvements were not caused spontaneously over time. Authors stated their search terms but they did not report their exact search strategy, which could make this search difficult to replicate. Only six of the studies included long-term follow-ups (≥6 months). Also, this study does not include any mean baseline measures so it is difficult to determine the severity of the subjects’ plantar fasciitis prior to treatment. This also prevents readers from knowing the overall treatment effect.
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| **Interpretation of Results**[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.] |
| * Currently, the amount of high quality, long-term studies that compare PRP injections versus corticosteroid injections in regards to plantar fasciitis is scarce. The results from this meta-analysis indicate that PRP injections are superior in regards to pain and function at 3 months, however the results are similar during succeeding follow-ups. This meta-analysis has a low risk of bias as evidenced by the AMSTAR measurement tool and it includes the latest evidence in regards to the topic. It is worth noting that only two studies included follow-ups beyond 6 months so knowledge of the injections long-term effects is currently limited.
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| **Applicability of Study Results**[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.] |
| * This meta-analysis does not include the characteristics of the individuals, beyond their age range, in the studies. Authors did report that subjects in 8 of the 10 studies had chronic plantar fasciitis as evidenced by them failing conservative treatment for at least 3 months. Since all of the articles that were reviewed for the PICO were included in this meta-analysis, it is known that the majority of the subjects were female. The ages of both groups ranged between 30.7 to 59.0 years. Both PRP and corticosteroid injections provide effective pain relief and improve function in subjects. Based on the information provided, the reader would recommend PRP injections since it produces significant improve in the patient’s pain and function at 3 months. If the financial cost was a significant factor, reader would recommend whichever injection was the cheapest since both bring similar outcomes for the most of the follow ups. Since characteristic information is limited, this only allows readers to generalize these findings to individuals that have failed standard care for at least 3 months, which restricts the reader’s ability to apply these results to a specific patient. The reader is unable to conclude if the patient’s obesity will factor into the outcomes of this intervention. The known characteristics of these subjects were similar to patient in the scenario in regards to her gender, age, and failed conservative treatment. The meta-analysis does report short term and long term results of both interventions but the lack of high quality, long term evidence does not make it conclusive.
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**SYNTHESIS AND CLINICAL IMPLICATIONS**

[Synthesize the results, quality/validity, and applicability of the two studies reviewed for the CAT. Future implications for research should be addressed briefly. Limit: 1 page.]

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| * Clinically, physical therapists will not be the ones administering these injections but they will be in place to provide recommendations to this patient population. This is a disease that is commonly treated in the clinic. Plantar fasciitis affects more than 1 million individuals every year and 10-30% of them do not respond to conservative management21,22. Studies reported that PRP and corticosteroid injections are effective at providing pain relief and improving function. Both studies demonstrated a low risk of bias as evidenced by their respective quality assessment tools. The Mahindra article reported that these improvements were similar between groups at 3 weeks and 3 months, except the PRP injections had a significantly higher AOFAS score at 3 months. The meta-analysis by Singh, which included the Mahindra article, reported that PRP injections had a significant difference in pain and function at 3 months, however there were not a significant difference during the groups during the 6 month and 12 month follow ups. The applicability of both articles to the patient in the scenario is limited by the lack of characteristic information, which only included age and gender, provided on the subjects in the study. Subject characteristics such as level of activity, obesity, occupations that require prolonged standing, over pronation, decreased ankle dorsiflexion, and time before receiving treatment can factor into their recovery16. Knowing these factors would allow readers to apply these studies to specific patient populations, instead of having to generalize. Half of the studies in the meta-analysis were not blinded, which could be a source of reporting bias. The Mahindra article is the only study to incorporate a placebo group, which validates that the improvements made were not due to the subjects recovering with time. Currently, there is a lack of high quality, long term studies, which limits the readers understanding of the long-term implications between the injections. Singh reported that there were not any reported adverse effects from either injection, however corticosteroids have been shown to have poor long-term relief and increases the risk of rupture6,23. Future studies should focus on the long-term difference between the injections. This would give readers a clearer picture of which injection would ultimately be the most beneficial in regards to expected outcomes, safety, and financial cost. Since PRP injections are likely to be more expensive due to its required preparation, its cost benefit must be worth it to the patient. There was significant heterogeneity in the studies included in the meta-analysis. Future studies should also work to standardize the preparation of the PRP because currently studies differed in use of activation agents, buffering agents, centrifugation, and volume injected.
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