Posterior Glenoid Dysplasia as a Secondary Finding to Labrum Tear and Subscapularis Strain: A Case Study

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ABSTRACT

The purpose of this disablement model case study was to describe the case of a collegiate baseball pitcher suffering from a labral lesion and supraspinatus strain that may have been the result of posterior glenoid dysplasia. Despite gross instability and glenohumeral external rotation weakness, the patient was initially able to continue to pitch. While posterior glenoid dysplasia has been described in literature, there have not been studies that have evaluated soft tissue changes that may be associated with this bony morphology abnormality. In this case, the patient reported to the athletic training staff complaining of pain, tightness, and a "clunking" sensation in and around his glenohumeral joint. The patient reported right shoulder pain being worse following pitching, but not experiencing symptoms during the act of pitching. The patient was initially treated with cupping and therapeutic exercise and was able to continue pitching. As the season progressed, the patient reported needing increasingly longer time to recover from pitching outings. The patient continued to present with a positive O'Brien's (Active Compression) test, weakness with internal and external rotation, and visible scapular protraction at rest. Upon referral to the team physician, radiographs were ordered to evaluate for bony pathology. The patient was diagnosed with posterior glenoid dysplasia and referred for magnetic resonance arthrogram. This imaging revealed a labrum tear and subscapularis strain. The patient was referred for surgery, at which time a labrum and subscapularis debridement, and subacromial bursectomy were performed. The patient was then instructed to follow up with the athletic training staff to initiate therapeutic exercise as prescribed by the attending surgeon. When evaluating glenohumeral weakness and instability, the clinician must consider bony abnormality as a potential factor. If initial treatment attempts do not result in improvements, the clinician must exhaust all diagnostic options to determine the exact nature of the offending pathology.

Key Phrases
Glenoid fossa, labrum pathology, rotator cuff

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INTRODUCTION

Posterior glenoid dysplasia is a relatively uncommon condition affecting the glenoid fossa of the scapula.[1] Generally, this condition has been described in osteoporotic patients, but has also been found to have a high incidence in young baseball players.[1,2] Glenoid dysplasia is believed to be the result of a failure of the glenoid pre-cartilage to ossify during gestation and early childhood.[1] Additionally, it has been suggested that there may be a hereditary component, with individuals potentially passing the morphology to future generations of their genetic line.[3] It has been suggested that the stresses applied to the anterior and posterior glenoid during overhead throwing my result in changes to the structure of the glenoid over time.[4] While there have been some data collected regarding the incidence and description of this condition, the authors were unable to find a study that reported the effects of this abnormal morphology on soft tissue structures such as the glenohumeral labrum.[1]

In a study examining the role of glenoid abnormalities in shoulder pain, Kirimura and his colleagues found that 89 of 91 young baseball players reporting with shoulder pain exhibited posterior glenoid dysplasia.[2] Currently the primary focus of existing literature is on bony

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pathologies associated with this abnormal morphology.[5] Thus, it is the purpose of this case study to describe a labrum tear and subscapularis strain of the right shoulder in a collegiate baseball player who also exhibited posterior glenoid dysplasia. This case will describe the presentation of injury, diagnosis, treatment, patient reported disablements, and outcomes.

Patient Information

The patient described in this case is a 19-year-old collegiate baseball pitcher. The patient reported a history of long term, high intensity, high frequency bouts of pitching, but had previous only been troubled by muscular tightness and delayed onset muscle soreness in his right shoulder. While he did not associate the symptom with pitching or pain, the patient also stated that his shoulder would "clunk" or "pop" when taken through certain motions. The patient noted that he did not experience symptoms while pitching, but would begin to feel pain and tightness within the first 24-hours post pitching. Initial evaluation revealed a positive O'Brien's (Active Compression) Test, negative Anterior Apprehension Test, negative Jobe's Relocation Test and weakness with glenohumeral internal and external rotation. The patient was placed on a preventative therapeutic exercise program that incorporated cupping therapy to address his reported muscular tightness and reported instability.

Differential Diagnosis and Evaluation

After initially reporting symptoms, the patient was evaluated following each pitching outing. The patient stated that the pain he was experiencing made it difficult to use his right arm during driving, and that he was unable to hold his cellular telephone in his right arm while talking for an extended period of time. The patient reported that his pain felt as though it was "too deep to touch," and that while treatment and exercise provided temporary relief, he would still experience the same level of pain after pitching. Given that the patient stated he was experiencing increasing levels of dysfunction, and presented with positive labrum symptoms, the treating athletic trainer made the decision to have the patient evaluated by the team physician. At this time, the differential diagnosis included: Labrum Pathology, Scapular Dyskinesis, Rotator Cuff and Scapula Stabilizer Weakness.

Two weeks after the patient initially reported his symptoms, during the team physician's evaluation, it was noted that the patient has multidirectional glenohumeral instability. However, instability tests did not elicit the pain that the patient stated was his primary concern. Following initial evaluation, the team physician determined it was necessary to pursue diagnostic imaging. Radiographs revealed posterior glenoid dysphasia. Consultation with the team orthopedic surgeon led to the patient being schedule for a magnetic resonance (MR) arthrogram to further evaluate the soft tissue structures of the shoulder. The MR arthrogram revealed significant inflammatory signal, leading the orthopedic surgeon to conclude that the patient had suffered an injury to his labrum and rotator cuff (**Figure 1**).

Figure 1. MR Arthrogram of Patient's Right Shoulder

At this time, the surgeon explained to the patient that without performing arthroscopic surgery it would be difficult to fully appreciate the severity of the damage to labrum and rotator cuff. The patient stated that the intensity and duration of the pain he felt following pitching was affecting his activities of daily living, and he wished to undergo surgery to address any damage that had been sustained.

Body Structure and Function

Given the injury and patient population, the primary diagnostic tools utilized to determine the need for an MRI arthrogram were orthopedic special tests, strength and range of motion tests, and patient reported history. At the initial time of injury, the patient presented with full range of motion, inability to pitch for long durations, and a 4/5 strength deficit with glenohumeral internal and external rotation.

Activity and Participation

In order to help the patient determine if he would be able to continue to participate in further competitions, the patient was allowed to pitch in one more competition following diagnostic imaging. The patient stated that while he was pitching, he did not notice significant pain. However, the patient experienced fatigue faster than he normally would have, and was unable to pitch longer than two innings. The following day the patient reported an increase in pain and stiffness compared to his previous pitching appearances.

Environmental and Personal Factors

Outside of baseball related activities, the patient stated that the pain he was experiencing in his shoulder was affecting his activities of daily living. Specifically, the patient stated that the intensity of pain inhibited his ability to obtain adequate quality sleep. Additionally, the patient reported difficulty turning the steering wheel of his car without patient. After his last pitching appearance, the patient stated that he was unable to brush his hair and teeth without pain. Given this increase in pain and the knowledge that there was some form of structural damage within his shoulder, the patient stated his desire to have his injuries surgically addressed as soon as possible. When consulting with the team orthopedic surgeon, the patient made the decision to delay surgery until after he had taken his final examinations out of concern for being unable to focus properly on his studies.

INTERVENTION

Immediately after initially reporting symptoms, the patient began participating in a rehabilitation plan consisting of elastic tubing and dumbbell exercises designed to address the present rotator cuff and scapula stabilizer weakness. These exercises were completed five to six times a week. In addition to these exercises, the patient continued to participate in his normal elastic tubing and range of motion exercises as part of his normal warmup prior to throwing. During this time the patient was allowed to continue throwing as tolerated.

Once the patient began to experience worsening symptoms and it was determined that continuing to pitch was not a viable option, the patient was instructed to discontinue all throwing and upper body weightlifting activities. The patient was then consented and scheduled for surgery following his final examination. Upon performing arthroscopic surgery, the surgeon found subacromial bursitis, a 20% subscapularis tear and fraying of the labrum at the attachment site of the long head of the biceps brachii. Based off of these findings, the surgeon performed a subacromial bursectomy, subscapularis debridement, and biceps brachii debridement. During his evaluation, the surgeon determined that the present posterior glenoid dysphasia was not severe enough to warrant surgical correction.

OUTCOMES

Body Structure and Function

After one week of rest following surgery, the patient began participating in light range of motion and strengthening exercises. As the patient regained range of motion and strength, exercises progressed in terms of intensity and volume. Throughout the progression in exercise the patient experienced intermittent bouts of expected soreness, but stated that his shoulder was beginning to feel increasingly stronger and pain free. Within four weeks, the patient had regained sufficient strength and range of motion to begin a throwing program. Over the course of the summer, the patient was able to progress in terms of distance and repetitions until he was cleared to begin training to pitch during the following fall baseball practices.

Activity and Participation

Through the surgical intervention and the initiation of the therapeutic exercise and throwing program, the patient was able to increase his amount and distance of throwing in order to be prepared to pitch when non-traditional practices began the following fall. After throwing, the patient noted that his soreness was not as intense or severe as it had been prior to surgery and rehabilitation. When asked, the patient noted that he felt as if he was able to recover more quickly than he had been prior to surgery.

Aside from baseball and pitching, sleep and activities of daily living that required extensive upper body usage began to grow easier as strength and range of motion improved. Had the patient not elected to undergo surgery, his symptoms would have likely continued to worsen to the point where they were affecting his activities of daily living even worse. Fortunately, the patient lived locally with his family who were able to assist him as needed, and he was able to complete his final examinations without incident.

Environmental and Personal Factors

Given the patient's expressed desire to be able to complete his final examinations in as little pain as possible, he remained adherent to his limitation regarding throwing and upper body weightlifting. Following surgery, the patient adhered to all scheduled rehabilitation times and was only absent from the athletic training clinic for a short period in order to vacation with his family. Because the ultimate decision was to discontinue activity until the patient's structural damage could be appropriately addressed there were no adverse effects from the chosen course of treatment.

DISCUSSION

This case describes the diagnosis and management of a patient suffering from subacromial bursitis, labral tear, and subscapularis partial tear with a secondary finding of posterior glenoid dysphasia. While posterior glenoid dysphasia is an uncommon finding, it has been described in a number of young baseball players complaining of shoulder pain.[2] Furthermore, in this case the posterior glenoid dysphasia did not appear to be the source of pain in the patient's shoulder. The team orthopedic physician did state that the glenoid dysphasia could have contributed to the humeral head resting against the glenoid fossa differently, but could not definitively attribute the soft tissue damage to the structural abnormality.

Overall, the choice to discontinue throwing even though the patient was still able to pitch effectively at the time was made based off the patient's concerns regarding educational goals. Had the patient chosen to continue to participate, it is possible that they would have been able to continue pitching. However, this continued participation may have led to worsening symptoms or further structural damage. Ultimately, the patient was able to return to throwing following surgery and therapeutic activity, and no adverse outcomes were reported.

CLINICAL BOTTOM LINE

Within the scope of clinical practice, it is entirely possible for clinicians to encounter diagnostic findings that are not well described in literature. In some instances, the available literature may indicate that these findings are part of the cause of the symptoms with which a patient presents. In all cases, clinicians must use their clinical qualifications to evaluate and re-evaluate a treatment and rehabilitation plan. Should conservative treatment fail and surgical intervention be warranted, the clinician may learn that previous findings were not the ultimate cause of a patient's symptoms. In these cases, a clinician must be prepared to adjust their treatment and rehabilitation plans accordingly. At all times, a clinician must prioritize their patient's safety and personal values. Based off of these values, clinicians may change their course of action within reason.

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