Conservative Management Of A Complete Rupture Of The Long Head Of The Biceps: A Case Report

Ali Woller

University of New England

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Ali Woller, BS

A. Woller, BS, is a DPT student at the University of New England 716 Stevens Ave. Portland ME 04103

Address all correspondence to Ali Woller at: awoller@une.edu

The patient signed an informed consent allowing the use of medical information and video footage for this report and received information on the institution’s policies regarding the Health Insurance Portability and Accountability Act.

The author acknowledges Matt Somma, PT, MTC, DPT, CSCS for assistance with case report conceptualization and Jop Blom, PT, PhD for supervision and assistance with patient management.

Key Words: biceps, rupture, conservative management
ABSTRACT

Background/Purpose: The long head of the biceps plays an important role stabilizing the shoulder. Most of the current literature supports surgical intervention following a complete rupture, but there is little evidence that supports conservative management. Due to a lack of evidence supporting conservative management of a complete rupture of the long head of the biceps, the purpose of this case study was to evaluate the progress this patient made over a six-week period with outpatient physical therapy addressing his impairments resulting from his injury. Case Description: The patient was a 51-year-old male with a confirmed diagnosis of a complete rupture of the long head of his biceps. The initial evaluation took place two and a half months after the accident due to a delay in seeking medical attention. He had a decreased ROM and strength, increased pain levels that effected his work, and an impaired QuickDASH score. Outcomes: After six weeks of conservative treatment, the patient had an increase in ROM, improved QuickDASH score, and reported a decrease in pain and increase in work capacity. Discussion: Despite the long duration between onset of injury and physical therapy, the patient appeared to benefit from conservative management based on objective findings and patient reported results.

INTRODUCTION/BACKGROUND and PURPOSE

The long head of the biceps plays an important role in stabilizing the shoulder.\(^1\) According to one study conducted on cadavers, it was concluded the long head of biceps significantly reduced anteroposterior and superiorinferior translation of the humeral head in the glenoid fossa.\(^2\) A tear of the long head of the biceps most commonly occurs when the biceps is suddenly loaded against flexion and supination of the elbow.\(^3\) When an individual tears the long
head of the biceps it is often a challenging decision whether they should chose surgical repair or conservative management.

A study that evaluated individuals who initially chose conservative management, showed 55.7% of the individuals who utilize conservative methods ultimately chose surgery. The study demonstrated that individuals with high demand jobs were significantly more satisfied with surgery over non-operative treatment. However, the study found there was no statistically significant difference between surgery and non-operative treatment in those with low demand jobs. Another study reviewed the satisfaction of surgical biceps rupture repair in 19 studies with a total of 86 individuals who underwent the surgery. The surgery resulted in a 94% satisfactory outcome measure, but surgical complications of the following were found: “lateral antebrachial cutaneous nerve paresthesia (17%), posterior interosseous nerve palsy (6%), elbow discomfort (2%), surgical revision (2%), and asymptomatic heterotopic ossification (1%).”

Lastly, a case study followed a soldier who chose conservative management of a complete tear of the short head of his biceps. Following conservative management, the soldier demonstrated full range of motion (ROM) and manual muscle test all within normal limits, and reported a 0% score on the QuickDASH. His only deficit noted was a 39.1% decrease in peak torque for elbow flexion and 36.3% decrease in peak torque for elbow extension.

Ultimately, making the decision to choose surgery or conservative management can be very difficult for patients and is debated in the literature. There was limited research on individuals who chose conservative management compared to surgical repair. The purpose of this case study was to evaluate the progress this patient made over a six-week period with conservative management for a complete rupture of the long head of the biceps. The patient was also unique due to the amount of time between when the injury occurred and when he sought treatment, two and a half months later.
Patient History and Systems Review

The patient provided consent to participate. The patient was a 51-year-old male who presented to therapy with a complete tear of the long head of his biceps. He worked a high physically demanding job as an electrician, which required heavy lifting, overhead work, and was relatively strenuous. He had a supportive wife and two children who were grown and moved out.

He was digging his work truck out when he stepped back into a pile of snow. His truck window was open and as he sunk into the snow, his initial reaction was to grab ahold of the truck door through the window to break his fall. He immediately heard a pop in his shoulder and felt a sharp pain. When he eventually went to his PCP, an MRI was ordered which showed a complete tear of his long head of the biceps. He discussed the possibility of surgery, but due to the minimal physical restriction he experienced and the chronic nature of the tear, the surgeon recommended trying physical therapy (PT). The patient also did not want to take the extended period off work for rehabilitation.

The patient’s PT evaluation occurred two and a half months after initial injury. His main concern was being able to perform his job. While he was able to perform all activities, he was concerned about the pain and the lack of ROM. His pain was primarily located in his right superior/lateral shoulder, with some pain in right scapula, and tightness inferior to shoulder while reaching overhead. He described the pain as a dull ache with intermittent pulsating pain. His other main concern was avoiding surgery. He did not want surgery due to the lengthy recovery and the amount of work he would miss. Secondly, there was a reduced guarantee that surgery would be successful since there was a span of two and a half months since the initial injury.
The patient’s past medical history included diabetes and hypertension, which were under control without medication at the time of the initial evaluation (IE). Other than an MRI of his shoulder, which revealed a full tear, and discussing surgery with the surgeon, he had not had any other professional interventions performed on his shoulder. He had found pain relief with NSAIDs that he takes daily to control pain. See Table 1 for the patient’s system review.

The patient was hopeful conservative treatment would be successful. His goals for PT included decreasing his pain, restoring ROM, and avoiding surgery.

Examination – Tests and Measures

The following tests and measures in Table 2 were administered to the patient during the IE after a thorough patient history was obtained.

Goniometry

To determine the ROM restriction the patient was experiencing, goniometry allowed us to measure his available active and passive ROM for his right shoulder and right elbow. The patient was seated on the edge of the plinth while these measurements were taken. Goniometry is highly reliable when measurements are taken by the same therapist, however interrater reliability is specific to the shoulder motion being measured.7

Manual Muscle Testing

Manual muscle testing (MMT) was used to assess if any strength deficits were present. Shoulder flexion, abduction, extension, internal and external rotation and elbow flexion and extension were all tested. The patient was again seated on the edge of the plinth with these measurements were taken. One literature review that analyzed over 100 studies determined that there is evidence for good reliability and validity of MMT.8 This study also determined that there is good external and internal validity and the MMT scores were not dependent upon examiner bias.8
Palpation

Palpation was used to determine if any trigger point or localized myofascial pain was present. The features of a trigger point include referred pain sensation, a positive jump sign, finding a nodule in taut band, and eliciting a local twitch. The last two characteristics are the most reliable making palpation for trigger points a reliable method to diagnosis myofascial pain. The patient had multiple trigger points found in the right shoulder region.

QuickDASH

The QuickDASH outcome measure was used to determine what activities the patient found limiting outside the clinic. The QuickDASH is reliable and a quicker substitution compared to the full DASH.

Visual Analog Scale

To determine the severity of the patient’s pain, he was asked to rate his pain levels on a scale of 0-10, with 0 being no pain and 10 being the worst pain imaginable. This is a commonly used method with in facilities that allow patients to quantify their pain levels.

Clinical Impression 2: Evaluation, Diagnosis, Prognosis

This patient continued to be appropriate for this case report based on his positive attitude, willingness to comply with home exercise program on a consistent basis, and nature of his case, particularly the duration of time that passed between initial injury and beginning of PT. According to the surgeon, surgery would have been much more difficult due to possible retraction of the muscle and the potential for the muscle’s inability to stretch due to the span of time since the initial onset of injury. The duration also caused this to be treated as a chronic injury (over 4 weeks) compared to an acute injury.
The PT plan for this patient was for him to be seen once a week, for 6 weeks. After six weeks, he had a follow up appointment with his surgeon to determine if he was satisfied with the progress he had seen in PT or if he would like to further investigate the option of surgery. His medical diagnosis was ICD-10 code was S46.12, laceration of musc/fasc/tendon long head of biceps. His PT ICD-10 code was M25.511, pain in right shoulder.

Prognosis expected for this patient was an improvement in ROM in his right shoulder and decrease in pain levels over six weeks allowing him to perform all work-related tasks. It was explained that physical therapy would not structurally fix the shoulder but it would address his ability to compensate for the loss of the long head of the biceps and improve ROM and pain.

One case report followed a patient who chose conservative management of a complete tear of his biceps brachii muscle and a partial tear of the coracobrachialis muscle. At a six month follow up the patient report no functional limitations or pain with work related activities or leisure activates. In addition, he scored a 0% on the QuickDASH. Based on improvements seen in this particular case report, it was anticipated that the patient would be able to regain full range of motion and have significant pain reduction during his work-related activities.

To evaluate the effectiveness of manual therapy and therapeutic exercises ROM was re-evaluated at the beginning and end of every session to document progress. In addition, the patient’s pain levels were recorded at the beginning of every session to determine how the patient progressed week to week. The QuickDASH was administered at initial evaluation and then again at six weeks. Interventions included: muscle energy technique to improve range of motion, soft tissue mobilization to address trigger points and tenderness in myofascial, and therapeutic exercise to maintain range of motion and strength outside the clinic. These
Interventions were chosen because they addressed limitations found in the initial examination that PT could treat. Two short term goals and three long term goals were assigned to the patient (Table 3).

**Coordination, Communication, and Documentation**

The results of initial examination, plan of care, and home exercise program were discussed with the patient. The physical therapist (PT) and the student therapist communicated to optimize treatment plan. The initial evaluation and progress notes were done using an electric medical record system. The initial evaluation and discharge note were faxed to the referring physician.

**Patient Instructions**

The patient was informed on the importance to PT and benefits it could provide. Following the initial evaluation, the patient was prescribed a home exercise program. The importance of being compliant with the home exercise program in order to meet goals was explained to the patient. The patient was also informed to modify painful activities after the initial evaluation.

**Procedural Interventions**

Muscle energy technique (MET) was used as an alternative to passive stretch. With MET, the patient meets the therapist's force to generate a gentle isometric contraction and then relaxes as the therapist applies force in the direction of the desired stretch. This technique uses autogenic or reciprocal inhibition to achieve lengthening of the desired muscle.\(^\text{12}\) MET was performed during the first visit to increase the patient’s internal rotation (IR). Isometric contractions were utilized in the direction of external rotation and for a duration of five seconds. One study by Fryer, supports the use of five second isometric contraction over 20 seconds when using MET. The study demonstrated a greater increase in ROM with the shorter duration of isometric contractions.\(^\text{13}\)
Soft tissue manipulation of the trigger points was completed to the tender areas found in the patient’s right shoulder region. The patient had tender areas found in the right infraspinatus, rhomboids, and deltoid insertion. Once found, a direct, constant pressure was applied to the most tender spot in the region. The patient was instructed to relax and inform the PT when the pain levels subsided approximately 50%. This was repeated to all the tender areas found. One study by Sohns et al showed significantly more improvement with manual trigger point therapy compared to a manual sham therapy in improvements of pressure pain thresholds.  

The patient performed an IR stretch to increase range of motion. The patient was instructed to hold a towel with the affected arm. The patient then reached his unaffected arm behind his back and picked up the opposite end of the towel. The unaffected arm slowly pulled the towel, parallel to the ground, across the back providing an IR stretch to the affected arm. The patient was instructed to bring the affected arm to where he felt a stretch, but no pain. He then held this position for 15 seconds, relaxed, and repeated three more times.

Lastly, the patient was provided a posterior capsule stretch. The patient was instructed to bring his affected arm across the front of his body and reach towards his opposite shoulder blade. Then with the unaffected arm, he applied an overpressure through his elbow in the direction he was already reaching. He applied pressure until he felt a stretch, but no pain. He held this for 15 seconds, relaxed, and then repeated for a total of three times.

During the second session, sleeper stretch against a wall was added to increase right shoulder IR by stretching the posterior capsule. The patient was instructed to stand with his back against a wall, right shoulder abducted to 90 degrees and elbow flexed to 90 degrees. He then applied a downward pressure with his left hand onto his right wrist into the direction of IIR. He was instructed to hold the stretch for 15 seconds, relax and repeat for a total of three repetitions.

During the third session, sleeper stretch was progressed by positioning the patient in side lying. The patient was instructed to lay on his right side with his arm forward flexed to 90 degrees and elbow flexed to 90 degrees. Verbal and tactile cues were given to the patient in order to maintain his shoulders
Woller, Complete Rupture of Long Head of Biceps

The patient was then instructed to push his right wrist with his left hand in the direction of shoulder IR. He was instructed to hold the stretch for 15 seconds, relax and repeat for a total of three repetitions. Chepeha et al studied the impact of the sleeper stretch on college level overhead athletes who had >15 degrees deficit of IR. After eight weeks, the study showed significant increase in IR.15

During the third session, scapular retraction exercise was given to strengthen the patient’s scapular retractors and aid in improving posture and scapular position. The patient was instructed to stand holding an orange resistance band (REP Band, Chattanooga, TN) in his hands, palms up. Elbows were flexed to 90 degrees and arms were shoulder width apart with just enough tension on the resistance band so there was no slack. He was then instructed to externally rotate both shoulders and “squeeze” his shoulder blades together, hold for three seconds then relax. He was instructed to repeat this ten times and complete a total of three sets. Scapular strengthening exercises were given to provide a stable base for optimal muscle activation which is crucial for proper shoulder function.16

A table depicting the treatment plan session to session can be found below (Table 4). The patient was compliant with therapy and his home exercise program. He arrived to all of his appointments on time and reported compliance with home exercise program two times a day.

TIMELINE

2 1/2 mo prior to IE

Initial Evaluation and Treatment #1
-QuickDASH: 20% impaired, Restricted ROM and MMT
-MET, Manual Therapy, Therapeutic

Week 1
Treatment #2
MET, Manual Therapy, Progress Therapeutic Exercise

Week 2
Treatment #4
MET, Manual Therapy, Progress Therapeutic Exercise

Week 3

Discharge
Improvement in ROM & VAS
QuickDASH: 9%

Week 4
Treatment #5
MET, Manual Therapy, Progress Therapeutic Exercise

Week 5

Week 6
OUTCOMES

On his final visit, the patient demonstrated improvements that included decreased tenderness in R infraspinatus, increased AROM and increased PROM compared to IE (Table 2). His AROM for forward flexion increased from 153 degrees to 168 degrees and his AROM for IR increased from 38 degrees to 51 degrees. Self-reported improvements from the patient included decreased pain with shoulder movements, improved working capacity, and improved QuickDASH score compared to IE (Table 2). His QuickDASH score decreased from 20 (20% impaired) to nine (9% impaired) and his VAS decreased from 7/10 to 2/10 after a day at work. The patient appeared compliant with home exercise program (HEP) and reported completing all exercises given to him. Ultimately, he felt his PT plan was successful and he was able to continue his work as an electrician with a decrease in pain and increase in ease. The patient experienced no adverse or unanticipated events throughout the course of treatment.

DISCUSSION

This case demonstrated its intended purpose by following the conservative management of a complete rupture of the long head of the biceps two and a half months after the injury. This case report enhances the literature on this topic because there has previously been a focus on surgical intervention and not on conservative management. Despite the patient not having met the minimal clinically important difference (MCID) on the QuickDASH, (15.91 point change required), he self-reported a decrease in his pain levels on the VAS after work and reported an increase in his functional work capacity due to the decrease in pain. The findings from this case report coincide with the findings in the literature including improvements in QuickDASH score and improvement in work capacity.11
One strength of this case report was the patient’s compliance with his HEP and attendance to PT. His enthusiastic attitude and determination to see improvements was favorable and allowed for more manual work in the clinic since he was consistent with HEP. One limitation was that this case report only followed the patient for six weeks. It would have been beneficial to follow up with the patient again at 12 weeks and again at 18 weeks to see the long-term outcomes.

Despite the patient having prolonged treatment for two and half months after the initially injury, he appeared to benefit from PT over the six-week course of treatment. Specifically, he appeared to benefit from a combination of manual therapy, MET, strengthening, and stretching. This conclusion is based on his improved ROM, decrease in pain, self-reported ease at work, and improved QuickDASH score. Overall, the patient demonstrated an increase in work capacity from conservative management of his biceps rupture over the course of six weeks without surgical intervention. Potential implications for clinical practice include offering and even possibly encouraging individuals to consider PT for the complete rupture of the long head of the biceps over surgery.

Future research comparing the long-term outcomes of conservative management to surgical interventions with a large population would be beneficial. Additionally, the literature would benefit from following multiple case reports of individuals who opted for PT to manage their symptoms.
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tear in a special operations soldier. *Phys Ter.* 2014;94(5):571-577. doi:


**TABLES and FIGURES**

Table 1. Systems Review

<table>
<thead>
<tr>
<th>Systems Review</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular/Pulmonary</td>
<td>Not impaired</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>Presents with ROM restrictions and pain.</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>Denies any neurological signs, i.e. no tingling or numbness down arm. Cervical screen negative.</td>
</tr>
<tr>
<td>Integumentary</td>
<td>Not impaired</td>
</tr>
<tr>
<td>Communication</td>
<td>Not impaired</td>
</tr>
<tr>
<td>Affect, Cognition, Language, Learning Style</td>
<td>Patient learns best from demonstration and performing exercises. He speaks English and has no cognition deficits.</td>
</tr>
</tbody>
</table>

ROM = Range of Motion

Table 2. Initial Evaluation Findings
### Table 3. Goals

#### Short term goals.

1. Patient will be independent with home exercise program by 07/06/2018.

2. Patient will gain 15 degrees of R shoulder internal rotation (55 degrees internal rotation) in order to reach behind his back by 07/20/2018.

#### Long term goals

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AROM = Active range of Motion, PROM = Passive range of motion, MMT = Manual Muscle Testing, IR = Internal rotation, ER = External Rotation, R = Right.

<table>
<thead>
<tr>
<th>Tests &amp; Measures</th>
<th>Initial Evaluation Results</th>
<th>Final Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>QuickDASH</strong></td>
<td>Scored a 20 (20% impaired)</td>
<td>Scored a 9 (9% impaired)</td>
</tr>
<tr>
<td><strong>AROM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Shoulder</td>
<td>Flexion: 153 degrees</td>
<td>Left Shoulder</td>
</tr>
<tr>
<td></td>
<td>Abduction: 150 degrees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER: 90 degrees</td>
<td>ER: 90 degrees</td>
</tr>
<tr>
<td></td>
<td>IR: 38 degrees</td>
<td>IR: 85 degrees</td>
</tr>
<tr>
<td>Right Elbow</td>
<td>Flexion: 140 degrees</td>
<td>Left Elbow</td>
</tr>
<tr>
<td></td>
<td>Extension: 0 degrees</td>
<td>Extension: 0 degrees</td>
</tr>
<tr>
<td><strong>PROM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Shoulder</td>
<td>Flexion: 160 degrees</td>
<td>Left Shoulder</td>
</tr>
<tr>
<td></td>
<td>Abduction: 150 degrees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER: 90 degrees</td>
<td>ER: 90 degrees</td>
</tr>
<tr>
<td></td>
<td>IR: 40 degrees * firm end feel</td>
<td>IR: 85 degrees</td>
</tr>
<tr>
<td>Right Elbow</td>
<td>Flexion: 140 degrees</td>
<td>Left Elbow</td>
</tr>
<tr>
<td></td>
<td>Extension: 0 degrees</td>
<td>Extension: 0 degrees</td>
</tr>
<tr>
<td><strong>MMT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Shoulder</td>
<td>Flexion: 5/5</td>
<td>Left Shoulder</td>
</tr>
<tr>
<td></td>
<td>Abduction: 5/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*reproduce pain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extension: 5/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*reproduce pain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IR: 5/5</td>
<td></td>
</tr>
<tr>
<td>Right Elbow</td>
<td>Flexion: 4+/5</td>
<td>Right Elbow</td>
</tr>
<tr>
<td></td>
<td>Extension: 5/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supination: 5/5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pronation: 5/5</td>
<td></td>
</tr>
<tr>
<td><strong>Palpation</strong></td>
<td>Tenderness over R infraspinatus, R rhomboids, and R deltoid insertion</td>
<td>Mild tenderness over R infraspinatus</td>
</tr>
</tbody>
</table>

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Visual Analog Scale

Patient’s score ranged from 0/10 at rest to 7/10 after a day of work.

Patient’s score ranged from 0/10 at rest to 2/10 after a day of work.

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351 Woller, Complete Rupture of Long Head of Biceps

352 AROM = Active range of Motion, PROM = Passive range of motion, MMT = Manual Muscle Testing, IR = Internal rotation, ER = External Rotation, R = Right

353

354 Table 3. Goals
1. Patient will have R shoulder A/PROM WNL in order to be able to do all work related activities by 08/04/2018.

2. Patient’s shoulder pain will not go above 1/10 while doing work related activities/household chores in order to be able to complete all work activities by 08/04/2018.

3. Patient’s score on QuickDASH will decrease by 10 by 08/04/2018.

AROM = Active range of motion, PROM = Passive range of motion, WNL = within normal limits, R = Right

Table 4. Interventions

<table>
<thead>
<tr>
<th>Session</th>
<th>Soft tissue mobilization</th>
<th>Manual therapy</th>
<th>Stretching</th>
<th>Strengthening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>(R) infraspinatus (R) rhomboid (R) Deltoid insertion</td>
<td>MET IR</td>
<td>IR stretch with towel behind back Posterior capsule cross arm adduction</td>
<td>N/A</td>
</tr>
<tr>
<td>Session 2</td>
<td>(R) infraspinatus (R) rhomboid (R) Deltoid insertion</td>
<td>MET IR</td>
<td>IR stretch with towel behind back Sleeper stretch against wall</td>
<td>N/A</td>
</tr>
<tr>
<td>Session 3</td>
<td>(R) infraspinatus (R) rhomboid (R) Deltoid insertion</td>
<td>MET IR</td>
<td>IR stretch with towel behind back Sleeper stretch in side lying</td>
<td>Scapular retractions with orange bands</td>
</tr>
<tr>
<td>Session 4</td>
<td>(R) infraspinatus (R) rhomboid (R) Deltoid insertion</td>
<td>MET IR</td>
<td>IR stretch with towel behind back Sleeper stretch in side lying</td>
<td>Scapular retractions with orange bands ER/IR with orange band</td>
</tr>
<tr>
<td>Session 5</td>
<td>(R) infraspinatus (R) rhomboid (R) Deltoid insertion</td>
<td>MET IR</td>
<td>IR stretch with towel behind back Sleeper stretch in side lying</td>
<td>Scapular retractions with green bands ER/IR with green band</td>
</tr>
</tbody>
</table>

MET = Muscle energy technique, ER = External rotation, IR = Internal rotation, R = Right

<table>
<thead>
<tr>
<th>CARE Content Area</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Title – The area of focus and “case report” should appear in the title</td>
<td>1</td>
</tr>
<tr>
<td>2. Key Words – Two to five key words that identify topics in this case report</td>
<td>1</td>
</tr>
<tr>
<td>3. Abstract – (structure or unstructured) a. Introduction – What is unique and why is it important? b. The patient’s main concerns and important clinical findings. c. The main diagnoses, interventions, and outcomes. d. Conclusion—What are one or more “take-away” lessons?</td>
<td>2</td>
</tr>
<tr>
<td>4. Introduction – Briefly summarize why this case is unique with medical literature references.</td>
<td>2-3</td>
</tr>
<tr>
<td>5. Patient Information a. De-identified demographic and other patient information. b. Main concerns and symptoms of the patient.</td>
<td>4-5</td>
</tr>
</tbody>
</table>
### 6. Clinical Findings
- Relevant physical examination (PE) and other clinical findings

### 7. Timeline
- Relevant data from this episode of care organized as a timeline (figure or table).

### 8. Diagnostic Assessment
- Diagnostic methods (PE, laboratory testing, imaging, surveys).
- Diagnostic challenges.
- Diagnostic reasoning including differential diagnosis.
- Prognostic characteristics when applicable.

### 9. Therapeutic Intervention
- Types of intervention (pharmacologic, surgical, preventive).
- Administration of intervention (dosage, strength, duration).
- Changes in the interventions with explanations.

### 10. Follow-up and Outcomes
- Clinician and patient-assessed outcomes when appropriate.
- Important follow-up diagnostic and other test results.
- Intervention adherence and tolerability (how was this assessed)?
- Adverse and unanticipated events.

### 11. Discussion
- Strengths and limitations in your approach to this case.
- Discussion of the relevant medical literature.
- The rationale for your conclusions.
- The primary “take-away” lessons from this case report.

### 12. Patient Perspective
- The patient can share their perspective on their case.

### 13. Informed Consent
- The patient should give informed consent.