

Serial external rotation shoulder spica cast application: A novel treatment for fixed internal rotation contractures/shoulder dysplasia in patients with brachial plexus birth injuries

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PURPOSE

Despite spontaneous recovery in many patients with brachial plexus birth injury (BPBI), permanent shoulder deformities may result from persistent internal rotation contractures that lead to posterior subluxation/dislocation of the humeral head.

Prevention and treatment of glenohumeral deformity is varied, including intensive therapy, complex splinting, botulinum toxin (Botox) administration, and surgical intervention in the form of muscle/tendon lengthening/release, tendon transfers and/or humeral osteotomy.

Shoulder spica cast immobilization is widely utilized to maintain glenohumeral joint reduction after secondary muscle and tendon procedures. Previous studies have shown that Botox injection into the internal rotator muscles of the shoulder and immobilization of the shoulder in an external rotation shoulder spica cast decreases the severity of internal rotation contractures and possibly prevents glenohumeral deformity in children with BPBI.

We seek to describe our experience with the addition of serial external rotation cast immobilization in combination with Botulinum toxin administration for treatment and prevention of fixed internal rotation contractures, as well as associated posterior subluxation/dislocation, of the glenohumeral joint.

METHODS

We performed retrospective review of 4 patients with fixed internal rotation contractures after BPBI who underwent serial external rotation cast application.

Age at initiation of treatment was 8 months - 3 years.

Shoulder passive external rotation in adduction and Active Movement Scale external rotation scores were recorded before and after treatment.

The initial cast was applied in maximal adduction and external rotation. Approximately 2 weeks after administration of Botox and placement of the cast, the strut/bar on the cast was cut and the shoulder was placed into maximal external rotation with application of a longer strut/bar. The cast was maintained for at least 4-6 weeks.

RESULTS

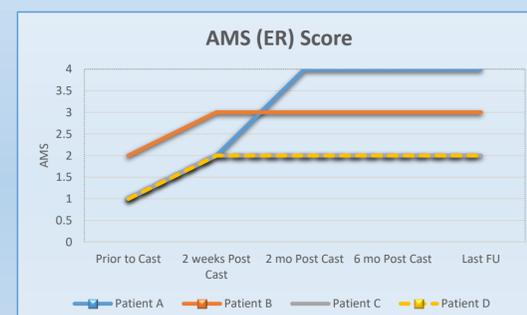
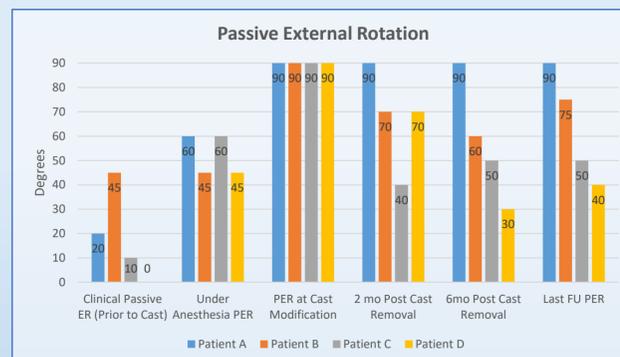
In all 4 patients, the initially fixed internal rotation contracture was fully corrected, and passive external rotation was achieved to 90 degrees at cast modification.

At 2 months post cast application all patients' passive external rotation was better than at baseline.

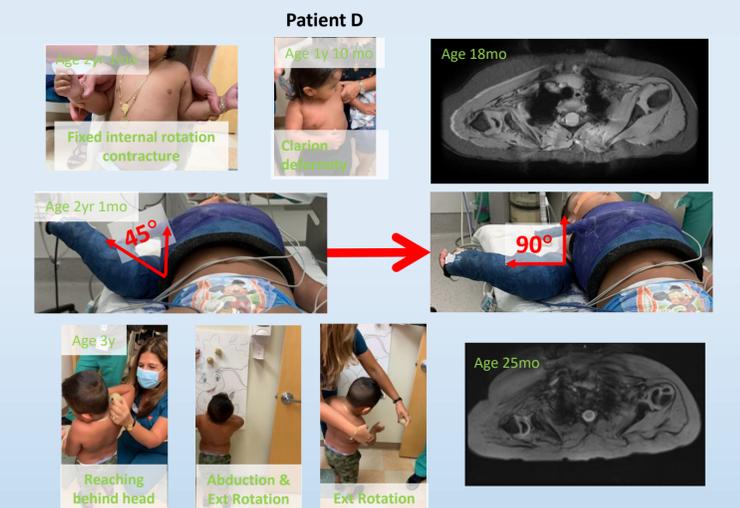
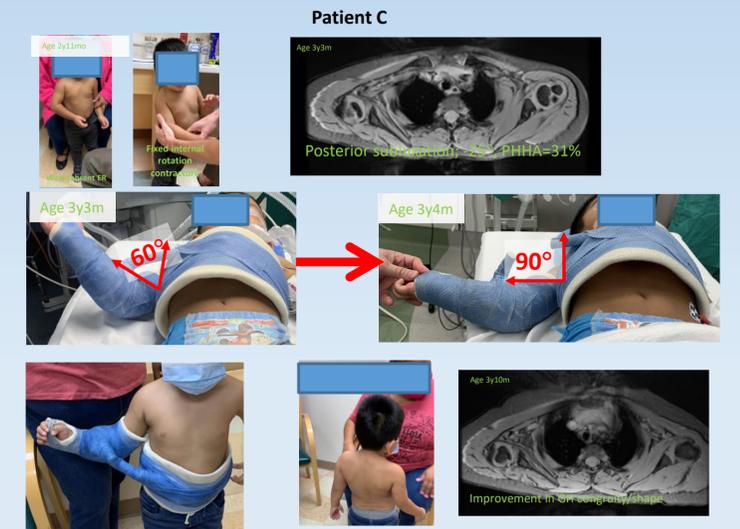
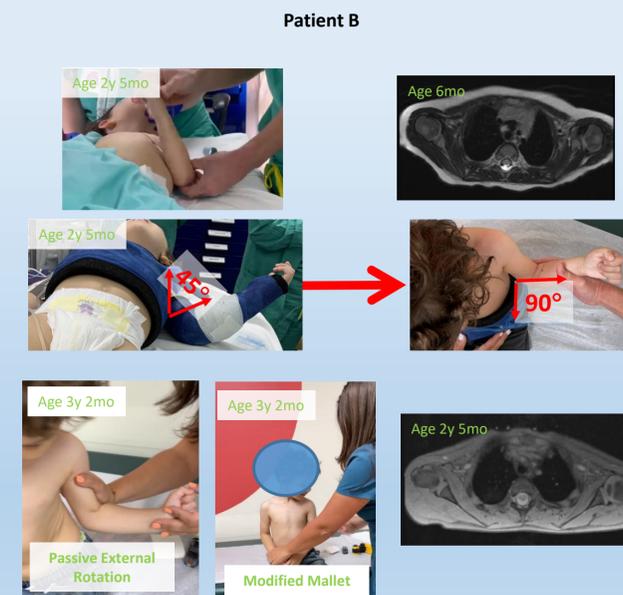
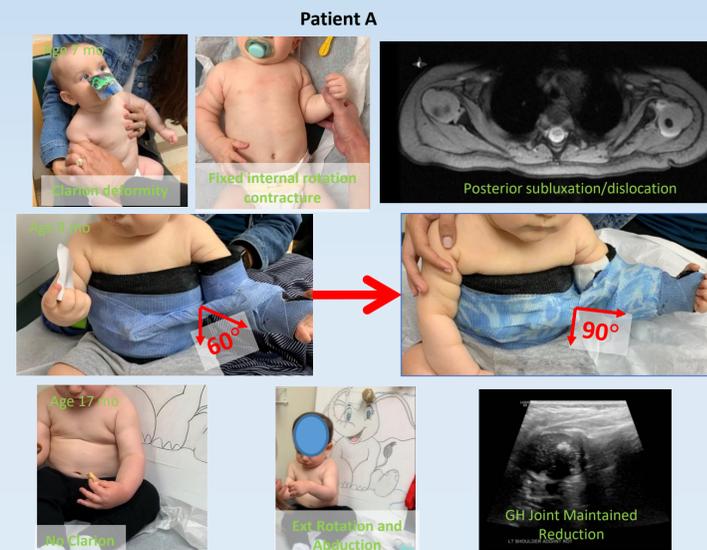
Imaging, when performed, also demonstrated reduction of the glenohumeral joint and improvement in the shape of the glenoid and humeral head. We believe that this technique should be attempted for fixed internal rotation contractures prior to performing open approaches for reduction of shoulder subluxation/dislocation.

Demographics:

Age Range (mo): 8-36
Sex (Male/Female): 4/0
Side (Right/Left): 2/2



REPRESENTATIVE EXAMPLES



CONCLUSION

Serial external rotation cast application, combined with Botox injection, improves internal rotation contractures due to BPBI and allows for reduction of shoulder subluxation/dislocation. This technique broadens the application of an already successful technique for management of internal rotation contractures. We have incorporated into our initial management plan for patients with BPBI.