

Case Report

Right congenital pseudoarthrosis of clavicle managed with plate fixation alone

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ABSTRACT

Congenital pseudoarthrosis of the clavicle is a rare developmental anomaly caused by failure of fusion between the medial and lateral ossification centers of the clavicle. Although often asymptomatic, surgical intervention may be indicated for cosmetic deformity, pain, or functional impairment. We report a case of a 12-year-old male with right-sided congenital pseudoarthrosis of the clavicle treated surgically by excision of the pseudoarthrosis and rigid plate fixation without bone grafting. Histopathological analysis confirmed fibrocartilaginous tissue consistent with pseudoarthrosis. At one-year follow-up, the patient was asymptomatic with full, pain-free shoulder range of motion and radiographic evidence of complete union without implant-related complications. This case demonstrates that stable internal fixation alone may be sufficient to achieve union in selected cases of congenital pseudoarthrosis of the clavicle, potentially avoiding donor-site morbidity associated with bone grafting.

Keywords: Congenital pseudoarthrosis, Clavicle, Plate fixation, Pediatric orthopaedics, Case report

INTRODUCTION

Congenital pseudoarthrosis of the clavicle is a rare condition characterized by failure of fusion between the medial and lateral ossification centers of the clavicle during embryonic development.¹ It most commonly presents as a painless swelling over the mid-clavicular region in early childhood and is reported more frequently on the right side.^{2,3} The condition must be differentiated from clavicular birth fractures, which typically show callus formation and spontaneous healing.⁴ While many patients remain asymptomatic, surgical intervention may be indicated for cosmetic deformity, pain, progressive mobility at the pseudoarthrosis site, or functional limitation.⁵

Various surgical techniques have been described, most commonly involving excision of the pseudoarthrosis,

autologous bone grafting, and internal fixation.^{6,7} However, the necessity of routine bone grafting remains debated. We report a case of right congenital pseudoarthrosis of the clavicle successfully treated with plate fixation alone and present the functional and radiological outcome at one-year follow-up.

CASE REPORT

A 12-year-old male presented with a visible deformity over the right clavicular region, noticed since early childhood. There was no history of trauma, infection, or perinatal complications. The patient reported mild discomfort during strenuous activities but denied pain at rest.

Clinical examination revealed a palpable gap over the mid-shaft of the right clavicle with abnormal mobility at the

site. Shoulder range of motion was full and painless. There was no neurovascular deficit, and the overlying skin was normal.

Plain radiographs of the right clavicle demonstrated a well-defined mid-clavicular defect with smooth, corticated bone ends, consistent with congenital pseudoarthrosis (Figure 1).⁸ The contralateral clavicle was normal.

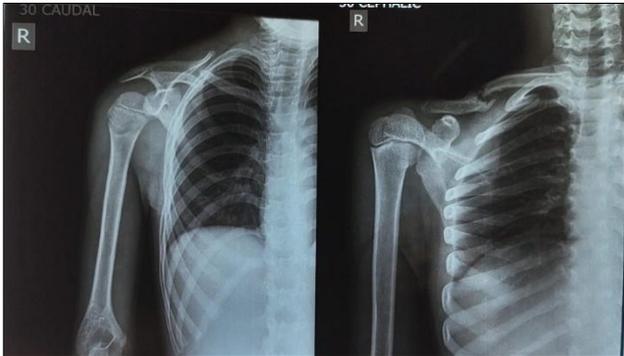


Figure 1: Pre op X-ray.

Surgical intervention was planned due to cosmetic concerns and abnormal mobility. Under general anesthesia, a standard superior clavicular approach was used. Intra-operatively, fibrocartilaginous tissue was identified at the pseudoarthrosis site and excised. Rigid fixation was achieved using a pre-contoured clavicular plate (Figure 2). No bone graft was used.



Figure 2: Immediate post op X-ray.

Excised tissue was sent for histopathological examination. Postoperatively, the limb was supported in an arm sling for comfort. Gradual shoulder mobilization was initiated, followed by progressive strengthening exercises.

Histopathological examination revealed fibrocartilaginous tissue with fibrous proliferation and bony fragments, confirming the diagnosis of pseudoarthrosis (Figure 3).

At one-year follow-up, the patient was pain-free and had returned to unrestricted daily activities. Clinical examination demonstrated full, symmetrical shoulder range of motion, including overhead abduction and

forward flexion, with no residual deformity or tenderness (Figures 4a and b).

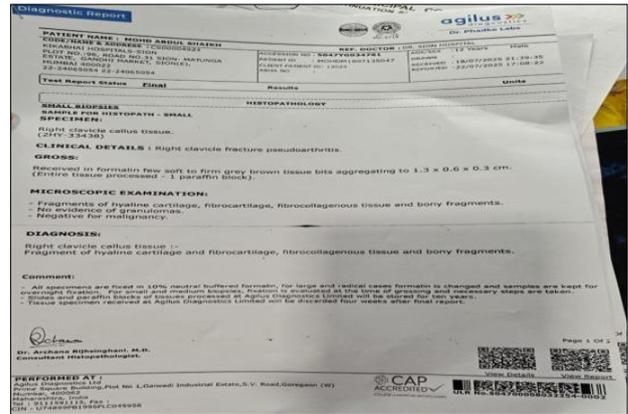


Figure 3: Histopathology report.

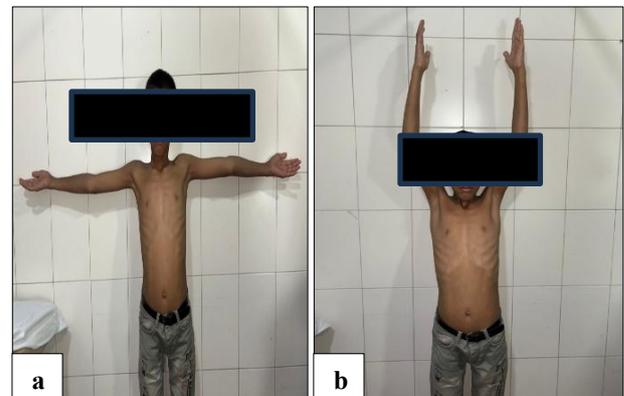


Figure 4: 1-year post op clinical pictures.

Radiographs obtained at one year showed complete union at the pseudoarthrosis site with maintained implant position and no evidence of loosening or failure (Figure 5).



Figure 5: 1-year post op X-ray.

DISCUSSION

Congenital pseudarthrosis of the clavicle (CPC) is a rare developmental anomaly characterized by failure of fusion

between the medial and lateral ossification centers of the clavicle. It was first described by Fitzwilliams in 1910 and remains an uncommon condition, with fewer than 300 cases reported in the literature to date.¹ CPC shows a strong predilection for the right side and female gender, a pattern attributed to the pulsatile effect of the subclavian artery interfering with clavicular fusion during embryogenesis.²⁻⁴

The etiology of CPC remains incompletely understood. Several theories have been proposed, including mechanical pulsation of the subclavian artery, genetic predisposition, and abnormal intrauterine positioning.^{2,5} Histologically, the pseudarthrosis resembles a synovial joint, with fibrocartilaginous tissue interposed between the clavicular fragments, explaining the low likelihood of spontaneous union.⁶ Clinically, patients usually present with a painless deformity over the clavicle during infancy or early childhood, although pain, cosmetic concerns, or functional limitation may develop with age.^{3,7}

Radiographically, CPC is characterized by smooth, well-corticated medial and lateral clavicular ends without signs of callus formation, which helps differentiate it from birth-related clavicle fractures.⁸ In our case, the diagnosis was established based on classic clinical appearance and radiological findings, and the patient was managed surgically due to progressive deformity and parental concern.

The optimal management of CPC remains controversial. Conservative treatment has been advocated in asymptomatic cases; however, several authors have demonstrated progression of deformity, cosmetic dissatisfaction, and potential functional compromise with non-operative management.^{3,9} Surgical treatment is generally recommended between the ages of 2 and 6 years to optimize healing potential and cosmetic outcomes.¹⁰

Most published surgical techniques involve excision of the pseudarthrosis, autologous bone grafting (commonly iliac crest), and internal fixation using plates or intramedullary devices.^{1,11-13} Bone grafting has traditionally been considered essential to promote union due to the avascular nature of the pseudarthrosis ends. However, graft harvesting adds donor-site morbidity, increased operative time, and postoperative pain.¹⁴

The present case is notable because union was achieved using plate fixation alone without the use of bone graft, with excellent clinical and radiological outcomes at one-year follow-up. This challenges the conventional belief that bone grafting is mandatory in all cases of CPC. Stable fixation with adequate compression may be sufficient to allow biological healing in selected patients, particularly younger children with good regenerative capacity. Similar isolated reports of union without bone grafting exist but remain scarce in the literature.¹⁵

At one-year follow-up, our patient demonstrated complete radiological union, absence of pain, full shoulder range of motion, and satisfactory cosmetic appearance. No implant-related complications, refracture, or functional limitation were noted. These outcomes support the concept that rigid stabilization alone can alter the biological environment of the pseudarthrosis and promote union, provided meticulous surgical technique and appropriate patient selection are ensured.

CONCLUSION

This case adds to the limited body of evidence suggesting that bone grafting may not be universally required in CPC and highlights the need for further studies comparing outcomes of fixation with and without grafting. While this is a single case and conclusions must be drawn cautiously, it provides a valuable contribution to the evolving surgical strategy for this rare condition.

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