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Management of Compartment Syndrome in Monteggia Fracture Bado Type III: A Case Report

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ABSTRACT

Background: Compartment syndrome is an orthopedic emergency caused by increased intra-compartmental pressure, leading to tissue oxygenation disruption and potentially resulting in tissue death. The rapid progression of this condition requires immediate diagnosis, primarily based on clinical examination results. Early management has been associated with improved outcomes and limb functionality.

Case Report: We report an 8-year-old girl who presented with complaints of pain and tingling in her left forearm since falling three weeks prior, with a history of traditional massage therapy or *sangkal putung*. Clinical examination revealed multiple dark red blisters, edema, and erythema. X-rays showed a Monteggia fracture. The patient was diagnosed with compartment syndrome and a Monteggia fracture and immediately underwent surgery for fasciotomy accompanied by open reduction and internal fixation (ORIF).

Conclusion: Compartment syndrome is a condition that poses risks to limbs and life. Diagnosis is primarily based on clinical examination, and immediate management can improve outcomes. Compartment syndrome should be addressed before managing any accompanying conditions.

KEYWORDS: Compartment syndrome, monteggia fracture, trauma, ORIF, fasciotomy

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INTRODUCTION

Compartment syndrome occurs due to an increase in intra-compartmental pressure that causes compression of muscle, vascular, and nerve structures. This condition causes severe pain due to decreased tissue oxygenation, leading to tissue death. The majority of compartment syndrome cases are associated with trauma, especially bone fractures. A very significant risk factor is age, with younger individuals being more susceptible to compartment syndrome.[1,2]

The diagnosis of compartment syndrome requires a very high level of suspicion from clinicians, as it is sometimes overlooked while handling other trauma injuries. The very rapid progression from the onset of symptoms makes this condition an emergency that requires immediate management and close monitoring.[3] We report a case of an 8-year-old girl with compartment syndrome and a Monteggia fracture that we treated at our institution.

CASE REPORT

An 8-year-old girl presented with complaints of pain in her left forearm since falling from a height of 1.5 meters three weeks ago, with her left arm used to break the fall. The parents took the patient to a traditional massage therapist where her arm was massaged and bandaged. Currently, the pain has worsened, accompanied by tingling, numbness, tightness, darkened skin, and the appearance of blisters on the skin. The patient can still move her fingers, but elbow movement is difficult due to pain.

Examination of the left forearm showed multiple dark red blisters, edema, and erythema (Figure 1a). On palpation, increased compartment pressure, hypoesthesia, and a palpable radial artery pulse were noted. Both active and passive joint range of motion were very painful. Oxygen saturation in each digit remained good.

Figure 1. Preoperative clinical and radiologic examination

Laboratory blood tests were within normal limits. X-ray examination of the left forearm showed a fracture in the proximal third of the left ulna consistent with a Monteggia fracture, callus formation, and soft tissue swelling (Figure 1b). The patient was managed in the operating room. Incisions on the dorsal sides were made for fasciotomy of the posterior compartments and expolarization of the anterior compartment (Figure 2). An estimation of 200 mL of blood was evacuated. Subsequently, debridement and washing of the fracture site, reduction, and reconstruction with ORIF were performed. Primary wound closure was achieved.

Figure 2. Dorsal fasciotomy

One day post-operation, the patient reported a reduction in pain and tingling. Examination showed residual signs of fasciotomy, reduced edema, some bleeding, and limited active and passive movement due to pain (Figure 3a). X-ray examination showed the internal fixation plate and screws in place, with the fracture line still visible (Figure 3b).

Figure 3. Postoperative clinical and radiologic follow-up

DISCUSSION

The diagnosis of compartment syndrome relies heavily on clinical examination findings. Clinically, this condition is characterized by rapidly worsening symptoms, pain that is disproportionate to the injury, and a sensation of tightness or tension in the limb compartment. Classically, this condition is marked by the 5 P's: pain, pallor, pulselessness, paresthesia, and paralysis. In this patient, the trauma occurred a long time ago, allowing for bone healing processes, as indicated by the formation of callus and malunion of the Monteggia fracture. The increased compartment pressure in this patient is very likely caused by the traditional healing of *sangkal putung*, in which massage and bandaging was performed on the arm, that is not only disrupted bone alignment and healing, but also affected neurovascular structures, leading to increased compartment pressure.[3,4]

The pain and tingling felt by the patient are caused by the pathophysiological process of compartment syndrome, where untreated increased pressure reduces the arteriovenous pressure gradient, limiting local tissue perfusion and causing cellular anoxia. Reduced oxygenation in the tissue leads to ischemic muscle damage, which, if untreated, will result in tissue death. This is what makes compartment syndrome an emergency condition.[5]

Imaging and laboratory tests have limited benefit in diagnosing compartment syndrome, with compartment pressure measurement, if available, being the modality of choice to support clinical findings. A pressure difference of 30 mmHg or less between diastolic pressure and compartment pressure is a diagnostic indicator for compartment syndrome. This modality was not available in our healthcare facility, so the diagnosis of compartment syndrome was made based on clinical examination, which revealed swelling of the left forearm accompanied by tension on palpation and neurological symptoms.[6]

The diagnosis of compartment syndrome must be made immediately, considering that damage tends to be irreversible within 6 hours of onset. Fasciotomy is the treatment of

choice, aiming for immediate decompression of the involved compartment. This procedure involves making large incisions to reduce compartment pressure in the affected limb.[7] In our case, fasciotomy was performed with dorsal incisions to decompress the anterior and posterior compartments. Once the compartment syndrome was addressed, the fracture issue could then be managed, and ORIF was performed on the patient's Monteggia fracture.

Fasciotomy has been proven to result in very good limb and functional recovery, especially if performed within 6 hours of onset. However, delays in treatment increase the risk of amputation. Postoperative care includes physical therapy, wound care, pain management, and antibiotics, with monitoring for improvement of complaints and symptoms.[8]

CONCLUSION

Compartment syndrome is one of the orthopedic emergencies that, if left untreated, increases the risk of outcomes that threaten both limbs and life. The diagnosis is primarily based on clinical examination, and immediate management can improve outcomes. Compartment syndrome needs to be addressed first before managing any accompanying conditions.

REFERENCES

I. Guo J, Yin Y, Jin L, Zhang R, Hou Z, Zhang Y. Acute compartment syndrome: Cause, diagnosis, and new viewpoint. Medicine (United States). 2019;98(27). doi:10.1097/MD.0000000000016260

II. Kanj WW, Gunderson MA, Carrigan RB, Sankar WN. Acute compartment syndrome of the upper extremity in children: Diagnosis, management, and outcomes. J Child Orthop. 2013 Jun;7(3):225–33. doi:10.1007/s11832-013-0492-9

III. Garner MR, Taylor SA, Gausden E, Lyden JP. Compartment Syndrome: Diagnosis, Management, and Unique Concerns in the Twenty-First Century. HSS Journal. 2014;10(2):143–52. doi:10.1007/s11420-014-9386-8

IV. Raza H, Mahapatra A. Acute Compartment Syndrome in Orthopedics: Causes, Diagnosis, and Management. Adv Orthop. 2015;2015. doi:10.1155/2015/543412

V. Miciak M, Jurkiewicz K. Compartment syndrome – a complex and insidious medical problem. Journal of Pre-Clinical and Clinical Research. 2023 Apr 28; doi:10.26444/jpccr/163321

VI. Long B, Koyfman A, Gottlieb M. Evaluation and Management of Acute Compartment Syndrome in the Emergency Department. Journal of Emergency Medicine. 2019 Apr 1;56(4):386–97. doi:10.1016/j.jemermed.2018.12.021

VII. McMillan TE, Gardner WT, Schmidt AH, Johnstone AJ. Diagnosing acute compartment syndrome—where have we got to? Int Orthop. 2019 Nov 1;43(11):2429–35. doi:10.1007/s00264-019-04386-y

VIII. Novak M, Penhaker M, Raska P, Pleva L, Schmidt M. Extremity compartment syndrome: A review with a focus on non-invasive methods of diagnosis. Front Bioeng Biotechnol. 2022 Jul 18;10. doi:10.3389/fbioe.2022.801586