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SUCKING INJURY RELATED IMPENDING ACUTE COMPARTMENT SYNDROME IN PEDIATRIC: A CASE REPORT

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Background: Compartment syndrome is a well-documented medical emergency most observed in traumatic injuries or conditions involving prolonged compression. **Case presentation:** A 5-year-old boy patient presented to the emergency room with complaints of severe right leg pain and immobility after being sucked by a pool pump. His whole right leg was tender and hardened with tension skin, signifying underlying intracompartmental pressure escalation. Nevertheless, posterior tibial and dorsalis pedis artery pulsations were found with 99-100% Oxygen saturation through all distal digital. Pelvic, femur, and cruris X-Ray result showed soft tissue swelling with intact bone without dislocation. Considering good distal oxygen saturation, we decided to be hospitalized patient under close monitoring in intensive care unit (ICU) and delaying surgery procedure. After 4 days of total hospitalization (2 days ICU followed by 2 days ward), the patient was discharged with excellent clinical outcome. **Conclusion:** Diagnosing compartment syndrome in pediatrics serves more challenging approach. Limited expression and communication skill of children warrant more suspiciousness from clinician to assess compartment syndrome. This case serves as a striking illustration of atypical pediatric compartment syndrome resulting from a sucking injury.

Keywords: Compartment syndrome; Emergency; Management; Pediatric; Sucking injury

INTRODUCTION

Compartment syndrome is a well-documented medical emergency most observed in traumatic injuries or conditions involving prolonged compression. While pediatric compartment syndrome is relatively rare, it requires prompt recognition and intervention to prevent irreversible damage and associated complications. In this case report, we describe a compelling scenario of pediatric compartment syndrome resulting from a sucking injury, presenting with clinical features that initially mimicked a closed degloving injury.[1,2]

The objective of this case report is to present a unique case of pediatric compartment syndrome caused by a sucking injury, emphasizing the diagnostic difficulties encountered and the importance of timely intervention for successful management. By sharing this case, we aim to raise awareness among healthcare professionals about this uncommon etiology and its potential to mimic other injuries.

CASE REPORT

A 5-year-old boy patient presented to the emergency room with complaints of severe right leg pain and immobility that had persisted for approximately 30 minutes following a swimming incident. The patient had been swimming when his right leg was inadvertently sucked into the pool pump for approximately 10 minutes. Fortunately, the leg was successfully released upon turning off the pump. Notably, there were no apparent signs of twisting or rotational injury to the leg.

Primary survey was within normal findings. Physical examination revealed a pale appearance of the right leg and the onset of persistent aching pain. Upon 10 minutes observation, swelling occurred within whole right leg with erythema. No deformity and open wound were observed. His whole right leg was tender and hardened with tension skin, signifying underlying intracompartmental pressure escalation. Hypoesthesia was observed and worse distally with restriction in range of motion and weakness. Nevertheless, posterior tibial and dorsalis pedis artery pulsations were found with 99-100% Oxygen saturation through all distal digital. Given the history of prolonged compression and the subsequent development of pale and painful leg, compartment syndrome was suspected.

Laboratory findings showed high PT (22.1 second) and INR (1.86) which suggest trauma occurred. Other laboratory parameters were within normal range. Pelvic, femur, and cruris X-Ray were ordered. The result showed soft tissue swelling with intact bone without dislocation **(Figure 1)**. Following good laboratory and radiology results, we made sucking injury related compartment syndrome as working diagnosis.

Considering good distal oxygen saturation, we decided to hospitalize patient under close monitoring in intensive care unit (ICU) and delaying surgery procedure. Pharmacology treatments were focused on symptomatic means. Oxtercid 500mg per 12 hour and Metamizol 250mg/8hour were administered. In addition, ringer lactate infusion and normal diet were

chosen to meet patients' requirements. Patient was in ICU for 2 days with good follow up result. No surgery was needed. Thus, we transferred patient into ward for another monitoring day. In the third day, patient already walking with tenderness residue. In the fourth day, no complaint was recorded. After 4 days of total hospitalization (2 days ICU followed by 2 days ward), the patient was discharged with excellent clinical outcome. Follow up parameters were recorded in **Table 1** with clinical presentation on **Figure 2**.

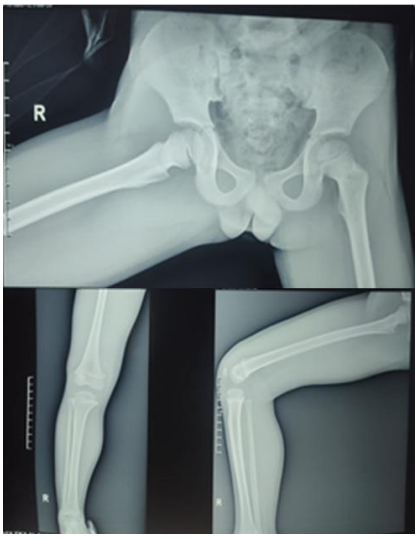

Figure 1. X-Ray examination result that showing soft tissue swelling with intact bone and no dislocation.

Table 1. Monitoring and follow-up during hospitalization

Para-meters	1st day	2nd day	3rd day	4th day
Clinical condition	Weak, stable vital sign, afebrile ,good intake	Weak, stable vital sign, afebrile, good intake	Active, stable vital sign, afebrile, good intake	Active, stable vital sign, afebrile, good intake
6Ps	Pain, paresth-esia, poikilo-thermic ,para-lysis	Pain, paresthes -ia, poikilo-thermic, paralysis , pallor	Pain	None
Care Unit	ICU	ICU	Ward	Ward
Change in Therapy	-	-	-	Dis-charged

Figure 2. Follow-up of clinical appearance during hospitalization . (A) 1st day admission, appear swelling, tender, numbness, and diminished function in the right leg (yellow arrow); (B) 2nd day care, appear pale on cruris segment with same clinical condition as day 1; (C) 3rd day care, resolve swelling with improvement in sensory and motoric function although tender and pain residue still be found; (D) 4th day care, no complaints, full function on sensory and motoric, discharged.

DISCUSSION

In this case, the patient went to the ER with suspicions of compartment syndrome of right leg. Led by a sucking pool pump incident, He ended up with compartment syndrome. Compartment syndrome usually occurs in one part of extremity. According to systematic review by Lin et al, lower leg is the most common site (60%), followed by fore arm (27%), hand and wrist (16%), foot (4%), upper arm (2%), and thigh (2%). Meanwhile the most common etiology is pedestrian versus vehicle incidence (21%), followed by iatrogenic (13%), motor vehicle accident (12%), falls (12%), sports injury (12%), crush injury (7%), infection 6%), vascular injury (5%), and non-accidental trauma (1%).[1] In details, fracture of tibial (11.6% rate) and ulna radius (2.3% rate) were the most common fractures leading to compartment syndrome. Nevertheless, compartment syndrome in children who are <10 years old commonly caused by vascular injury or infection.[2] Acute compartment syndrome that happen in entire leg such as in this case are not yet reported. Furthermore, sucking injuries in which a limb gets caught in the pump, are relatively rare cases of injury without incidence rate data.

Diagnosing compartment syndrome in pediatrics serves a more challenging approach. Limited expression and communication skill of children warrant more suspiciousness from clinician to assess compartment syndrome.[2] In toddler patient who unable to cooperate, 3As sign is preferred than 6Ps sign which were anxiety, agitation, and increased analgesic requirement.[3] Fortunately, patient in this case was cooperative. Patient's complaints in this case were pain, unable to sense light touch, unable to move the leg, and prominent swelling of the right leg. These was in line with Lin et al findings which the most common symptoms found in pediatric patients are pain (88%), paresthesia (32%), swelling (28%), and paralysis (26%). Another two P which are pulseless and pallor were two least symptoms which found in 13% and 12% case respectively.[1]

No significant change in laboratory parameters and no significant findings on right leg X-ray. The wood-like feelings upon palpation and observed 4 of 6 Ps gave clinical suspicion of compartment syndrome. Furthermore, administration of Intravenous analgesic only dose small pain relieve on patient as Teng et al stated that even local anesthesia gave little pain reliever.[4] No creatinine phosphate-kinase and intra-compartmental pressure measurement. Although, 30 mmHg intra-compartmental pressure suggest acute compartment syndrome and need fasciotomy, pressure below that value does not exclude acute compartment syndrome.[1] We proposed a figure concept to help understanding of intra-compartment pressure and its association to the progression of compartment syndrome. The concept is shown as **Figure 3.**

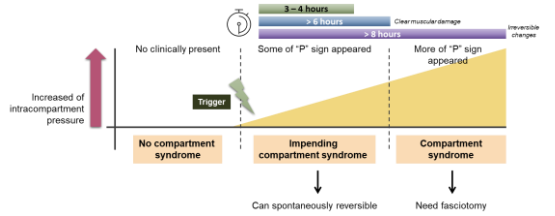

Figure 3. Concept of intra-compartment pressure and compartment syndrome.

Patient was not treated by fasciotomy immediately since dorsalis pedis and tibial posterior pulsation still found with 99-100% distal oxygenation saturation. In spite, the patient undergo close monitoring of distal oxygenation in ICU. After 2 days of monitoring, the patient then transferred into ward. This is in line with Lin et al observation that the peak of compartment syndrome in pediatric was 48 hour after initial injury, which longer than adult patient which is 24 hour after initial injury.[1] After 2 more follow up days on ward, patient was discharged without any complaints with complete recovery of limb function.

Atraumatic events of compartment syndrome is rare. Most cases usually preceded by arterial cannulation, deep vein thrombosis, intravenous infiltration, spontaneous bleeding, intraosseous cannulation, or vasculitis. In vascular etiology, some changes in physical findings are worsened pain, pulseless, and paralysis. Another rare occurrence is exertional compartment syndrome which is benign that induced by exercise and relieved by rest.[5]

Mode of injury in this case was aid another suspicion for closed degloving phenomenon. However, according to Nair et al review, closed degloving resembles a swelling yet fluctuative injury. Usually occurs in upper leg related to fracture of the femur.[6] Another closed degloving related to compartment syndrome case was presented by Kateros et al. In their case, the skeletal of fifth toe was separated from it flesh, resulting in non-palpable bone in distal fifth toe. They called it empty toe injury. The right pedis appears swollen, tender, and hardened. Thus, fasciotomy was performed along with reduction of fifth phalanx to its place and amputation of distal phalanx. The outcome was satisfying.[7] Based on these 2 cases, this case does not have characters of closed degloving injury.

CONCLUSION

This case serves as a striking illustration of pediatric compartment syndrome resulting from a sucking injury. It highlights the importance of prompt recognition, early intervention, and a multidisciplinary approach in managing this potentially limb-threatening condition. By sharing this case, healthcare professionals can gain valuable insights into the diagnostic challenges and treatment strategies associated with atypical presentations of compartment syndrome in pediatric patients, ultimately improving clinical outcomes.

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CONFLICT OF INTEREST

This case was presented by Farhan Hilmi Taufikulhakim, MD at *Jakarta Course in Orthopaedic and Seminar in Trauma Management* (JACOST) in the case discussion session. However, this case report is not published in any journals.

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