

Acute Compartment Syndrome-A Clinical Analysis

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ABSTRACT

Background: The outcome of ACS is determined by the duration of ischaemia. The present study was conducted to assess cases of acute compartment syndrome. **Methods:** 88 children of acute compartment syndrome of both genders were included. Data such as type of injury (bone/soft tissue), the period between admission and definitive treatment, etc. were noted. **Results:** Site of injury was forearm in 34 and 20 in group I and II respectively, leg in 12 and 8 in group I and II respectively, in foot in 4 and 10 in group I and II respectively. Mechanism of injury was HVT in 33 in group I and 22 in group II and LVT in 17 and 16 in group I and II respectively. Type of fasciotomy was external fixator in 30 and 26 in group I and II respectively and K- wire in 20 and 12 in group I and II respectively. Time from injury to admission was 26.1 minutes in group I and 25.4 minutes in group II and mean hospital stay was 20.4 and 19.3 minutes in group II. The difference was significant ($P < 0.05$). **Conclusion:** Presence of three or more clinical signs suggestive of increased intra-compartment syndrome in acute compartment syndrome and emergency fasciotomy are crucial.

Keywords: Acute compartment syndrome, External fixator, Fasciotomy.

INTRODUCTION

Acute compartment syndrome (ACS) was first described by Volkmann in 1881. The management of ACS in adults is well described, but only a few studies were conducted involving children with ACS. ACS is a diagnostic dilemma in small children, who may not have the ability to provide clinical information, resulting in a delay in the diagnosis and management. The early diagnosis of ACS is a vital factor, which determines the prognosis. The outcome of ACS is determined by the duration of ischaemia, the pressure in osteofascial compartment and causes of increased compartment pressure.^[1,3]

The incidence rate of ACS was reported 30.4% especially in shaft and proximal regions of tibia. The higher incidence of ACS in proximal tibia is directly related to high energy trauma causing comminuted fractures, especially those affecting the entity of medial tibial plateau and increased with the fracture line extended laterally. To prevent serious complications induced by ACS, fasciotomy should be done before irreversible tissue necrosis occurs, thus there is a strong clinic bias toward doing fasciotomy empirically or prophylactically in patients who are considered to be at high risk and/or who have concerning clinical findings.^[4]

ACS most frequently occurs after a traumatic event; however, up to 30% of cases develop without evidence of fracture. Other factors that have been associated with ACS include ischemia-reperfusion injury; hemorrhage; phlegmasia cerulea dolens; vascular puncture in patients with bleeding disorders; intravenous/arterial drug injection; and soft tissue injury resulting from prolonged limb compression due to lithotomy positioning during surgery, constricting casts or wraps, crush injury, or burns. The present study was conducted to assess cases of acute compartment syndrome.^[5]

MATERIALS AND METHODS

The present study comprised of 88 children of acute compartment syndrome of both genders. All were informed regarding the study and written consent was obtained from their parent. Patient's data such as name, age, gender etc. was recorded. Data such as type of injury (bone/soft tissue), the period between admission and definitive treatment, etc. were noted. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1: Distribution of patients

Total- 88		
Gender	Males	Females
Number	50	38

[Table 1] shows that out of 88, males were 50 and females were 38.

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Table 2: Assessment of parameters

Variables	Parameters	Group I (Males)	Group II (Females)	P-value
Site of injury	Forearm	34	20	0.04
	Leg	12	8	
	Foot	4	10	
Mechanism	HVT	33	22	0.02
	LVT	17	16	
Type of fasciotomy	External fixator	30	26	0.05
	K- Wire	20	12	
Time from injury to admission (Minutes)		26.1	25.4	0.14
Hospital stay (Mean)		20.4	19.3	0.18

[Table 2, Figure 1] shows that site of injury was forearm in 34 and 20 in group I and II respectively, leg in 12 and 8 in group I and II respectively, in foot in 4 and 10 in group I and II respectively. Mechanism of injury was HVT in 33 in group I and 22 in group II and LVT in 17 and 16 in group I and II respectively. Type of fasciotomy was external fixator in 30 and 26 in group I and II respectively and K- wire in 20 and 12 in group I and II respectively. Time from injury to admission was 26.1 minutes in group I and 25.4 minutes in group II and mean hospital stay was 20.4 and 19.3 minutes in group II. The difference was significant (P < 0.05).

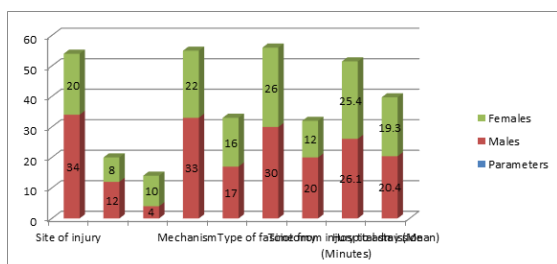


Figure 1: Assessment of parameters

Table 3: Complications after treatment

Complications	Number	P value
Wound infection	2	0.02
Chronic contractures	1	
Sensory deficit	6	
Chronic osteomyelitis	1	

[Table 3] shows that common complications were wound infection in 2, chronic contractures in 1, sensory deficit in 6 and chronic osteomyelitis in 1 case. The difference was significant (P < 0.05).

DISCUSSION

The early diagnosis of ACS is a vital factor, which determines the prognosis. The outcome of ACS is determined by the duration of ischaemia, the pressure in osteofascial compartment and causes of increased compartment pressure.^[6] If the diagnosis and management is delayed, then this may lead to extensive muscular and neurovascular damage or myoglobinaemia resulting in acute renal failure.^[7] The symptoms of ACS include swelling, pain on passive stretch, pain out of proportion to the injury, paresthesia, and paresis or paralysis; however, it is important to note that not all characteristic of ACS

may be present.^[8] Clinical signs such as pallor, reduced capillary return, and absent peripheral pulses are late signs of ACS, and therefore the presence of distal pulses should not be relied on to exclude a diagnosis of ACS. Significantly increased creatine kinase (CK) levels in the blood are also not a good indicator for early diagnosis of ACS, because they may indicate severe muscle damage or ischemia.^[9] The present study was conducted to assess cases of acute compartment syndrome.

In present study, out of 88, males were 50 and females were 38. Singh et al,^[10] in their study children presenting with clinically suspected acute compartment syndrome were studied. These were divided into two age related groups: Group A (children < 14 years) comprising of 12 children and Group B (14 or > to 18 years) comprised of 20 children. Patients' demographics, diagnosis, treatment, follow-up and complications were analyzed. In group A, the mean time from admission to fasciotomy was 13.7 hours (range 5.5 – 36 hours), whereas in group B, fasciotomy was performed at mean time 12.8 hours (6.5 – 24 hours). In group A, the eight fractures were treated by external fixators while rest four cases were fixed with K wires. In group B, eleven patients received intra-medullary nails, eight were managed by external fixators and in one patient K wires were used to fix the fracture. Acute compartment syndrome represents a surgical emergency. The clinical signs predict and corroborate with acute increases in compartment pressure effectively.

We found that site of injury was forearm in 34 and 20 in group I and II respectively, leg in 12 and 8 in group I and II respectively, in foot in 4 and 10 in group I and II respectively. Mechanism of injury was HVT in 33 in group I and 22 in group II and LVT in 17 and 16 in group I and II respectively. Type of fasciotomy was external fixator in 30 and 26 in group I and II respectively and K- wire in 20 and 12 in group I and II respectively. Time from injury to admission was 26.1 minutes in group I and 25.4 minutes in group II and mean hospital stay was 20.4 and 19.3 minutes in group II. Common complications were wound infection in 2, chronic contractures in 1, sensory deficit in 6 and chronic osteomyelitis in 1 case.

Acute compartment syndrome is an important differential diagnosis in the setting of sudden onset

of lower limb pain following childbirth. Predisposing factors for its manifestation within an obstetric environment are augmented labor, the lithotomy position, postpartum hemorrhage, hypotension following epidural analgesia, and the use of vasoconstrictive agents. If left undiagnosed and untreated, acute compartment syndrome may cause permanent neurovascular deficit, leading to a poor functional result, tissue ischemia, limb amputation, and rhabdomyolysis.^[11] If severe, and in large compartments, it can lead to renal failure and death. Alertness and a high index of clinical suspicion for the possibility of acute compartment syndrome are required to avoid a delay in diagnosis, and intracompartmental pressure measurement can be used to confirm the diagnosis.^[12]

CONCLUSION

Authors found that presence of three or more clinical signs suggestive of increased intra-compartment syndrome in acute compartment syndrome and emergency fasciotomy are crucial.

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