

CHARACTERISTICS OVERVIEW OF PEDIATRIC PATIENTS WITH FEMORAL SHAFT FRACTURES AT SANGLAH GENERAL HOSPITAL DENPASAR BALI PERIOD JANUARY 2017 - DECEMBER 2017

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Abstract: Children are vulnerable to injury apart from their developing motor skills, great curiosity leads them to Dangers Often that they have not understood or which they do not Realize. Femoral Fracture is one of the musculoskeletal injury involving the lower extremity with high disability rates throughout the world. The characteristic of femoral shaft fractures in Indonesia is still variable especially in Bali, and only a few conduct research on this. The study aims to Determine the characteristic of femur fractures in children at Sanglah General Hospital in Denpasar Bali and conducted with a cross-sectional study on 40 samples of femur fracture of children at Sanglah General Hospital in Denpasar Bali from January 2017 to December 2017 using the secondary of data from the patient's medical record. From 40 samples Showed that the majority of sex is a male within 28 people (70%), from the age group most ages 11-years of skeletal maturation were 26 people (65%). About 36 cases (90%) were closed fracture with right side involvement of extremity for 24 cases (57.5%). High energy injury of femoral fractures in children aged less than 11 years was treated conservatively for 10 cases (100%) and 25 cases (100%) treated operatively in age 11 years until skeletal maturity. This research pointed out that age ie characteristic femoral fracture, fracture configuration and mechanism of injury are very important to justify the treatment. High energy injury of femoral fractures in children aged less than 11 years was treated conservatively for 10 cases (100%) and 25 cases (100%) treated operatively in age 11 years until skeletal maturity. This research pointed out that age ie characteristic femoral fracture, fracture configuration and mechanism of injury are very important to justify the treatment. High energy injury of femoral fractures in children aged less than 11 years was treated conservatively for 10 cases (100%) and 25 cases (100%) treated operatively in age 11 years until skeletal maturity. This research pointed out that age ie characteristic femoral fracture, fracture configuration and mechanism of injury are very important to justify the treatment.

Keywords: Characteristic, femoral fracture, children.

I. INTRODUCTION

Children are susceptible to injury because their motor skills are still in developing and because their curiosity often leads them to the dangers that they do not understand or do not realize.² A fracture is one of the causes of worldwide high rate of disability. One of them, femur fractures, often occur because of trauma.⁵ Hard injuries on bones can lead to fractures and children are more likely to experience fractures. This is consistent with the results of the research at the University of Nottingham, that at children age are at risk of developing different types of injuries, including among children aged 3 to 5 years are at risk of fractures.⁷ The classic symptoms of a fracture are pain and swelling in the area of fractures, deformities, disorders of the musculoskeletal function, discontinuity of the bone, and neurovascular disorders.⁷ In

Indonesia there are still very little researches on femur fractures in children, therefore, in this study, the authors wanted to know the characteristics of cases of femur fractures in children based on age and gender at Sanglah Hospital in Denpasar Bali from January 1st 2017 to December 31st 2017.

II. MATERIALS AND METHODS

This study is a cross-sectional descriptive study conducted from March 2018 to August 2018. By using secondary data from medical records of femur fractures in children. The sampling technique used total sampling secondary data obtained from medical records in medical record storage room Sanglah Hospital Denpasar and obtained 40 samples. The subjects were selected from a population that met the inclusion criteria, which is children <18 years with femur fractures and do not meet the exclusion criteria which is incomplete medical records.

All data obtained will be analyzed using SPSS 16.0 software. Data obtained are the distribution of femur fractures' cases in children by age, gender, type of fracture, hand fracture, timing, treatment and mechanism of injury.

III. RESULTS

During the study period, the number of samples obtained are as many as 40 samples where the majority of the male sex were 28 samples (70%) and women were 12 samples (30%). Besides divided by gender, samples are also classified based on the specific age group, the age group <1 year as many as 3 (7.5%) samples, the age group 1-5 years as many as 6 (15%) samples, groups of 6-10 years as many as 5 (12.5%) samples and group of age >11 years as many as 26 (65%) samples. Data on the type of fracture is obtained from reading a patient's medical records and obtained as many as 36 samples of closed fractures (90%) and for open fractures as many as 4 (10%) samples. From these data, a total of 24 (57.5%) fractures are located on the right side, 15 (40%) fractures are located on the left side and 1 (2.5%) fractures are located both on the right and left. Samples with <6 hours treatment as many as 38 (95%) samples and > 6 hours as many as 2 (5%) samples. The distribution of the samples contained 35 (87.5%) samples with high energy mechanism of injury, 3 (7.5%) samples with low energy mechanism of injury and 2 (5.0%) samples with birth trauma. Then the final one for therapy distribution, 15 (37.5%) samples with conservative therapy and 25 (62.5%) samples with surgery therapy.

TABLE I: DISTRIBUTION AND CHARACTERISTICS OF PEDIATRIC PATIENTS WITH FEMORAL SHAFT FRACTURES BY AGE, GENDER, TYPE OF FRACTURE, SIDE OF FRACTURE, TIMING, MECHANISM OF INJURY AND THERAPY

Characteristics		N = 40 , Mean ± SD (%)
Age	<1 year	3 (7.5)
	1-5 years	6 (15)
	6-10 years	5 (12.5)
	11 - the age of skeletal maturation	26 (65)
Gender	Man	28 (70)
	Woman	12 (30)
Type Fractures	Closed	36 (90)
	Open	4 (10)
Fractures Side	Right	24 (57.5)
	Left	15 (40)
	Right and left	1 (2.5)
Time	<6 hours	38 (95)
	> 6 hours	2 (5)
MOI	High Energy	35 (87.5)
	Low Energy	3 (7.5)
	Birth Trauma	2 (5.0)
Therapy	Conservative	15 (37.5)
	Operative	25 (62.5)

Distribution and characteristics of pediatric patients with femoral shaft fractures by age, gender, type of fracture, side of the fracture, time of occurrence, mechanism of injury, and therapy can be seen in Table 1. Distribution of femur fractures in frequency with age <1 year as many as 3 (7.5%), aged 1-5 years as many as 6 (15%), aged 6-10 years as many as 5 (12.5%), and age >11 years as many as 26 (65%). While the distribution by sex of the sample was 28 (70%) men and 12 (30%) in women. Distribution by type of fracture based on data from a sample consisting of a closed fracture as many as 36 (90%) and an open fracture as many as 4 (10%). Distribution by side of fractures based on data from a sample

consisting of right side fracture as many as 24 (57.5%), the left side fracture as many as 15 (40%), and the right side fracture as many as 1 (2.5%). Distribution by the time of occurrence taken from the sample consisting of <6 hours as many as 38 (95%) and > 6 hours as many as 2 (5%). On the distribution of the samples contained high mechanism energy by 35 (87.5%), low energy by 3 (7.5%) and birth trauma by 2 (5.0%). Then the final distribution of the sample based on therapy modalities consists of conservative therapy as many as 15 (37.5%) and surgery therapy as many as 25 (62.5%).

For the distribution based on the femoral shaft fracture mechanism of injury can be seen in Table 2. These distributions are distinguished by four age groups of <1 year, 1-5 years, 6-10 years and 11 years. At high energy trauma as many as 35 samples with 1 sample distribution by age <1 year with a percentage of 2.5%, then 5 samples at the age of 1-5 years with a percentage of 10%, a total of 4 samples at the age of 6-10 years with percentage of 10%, and 25 samples with a percentage of 62.5% at the age 11.

While in the low-energy trauma, there are 3 samples with 1 sample each at the age of 1-5 years, 6-10 years, and 11 years. Birth trauma femur fracture obtained at the age <1 year are 2 samples with a percentage of 5%. While for birth trauma there are 2 samples obtained with a percentage of 100% and are all treated conservatively.

TABLE II: DISTRIBUTION AND CHARACTERISTICS OF PEDIATRIC PATIENTS WITH FEMORAL SHAFT FRACTURES BY AGE CLASSIFICATION AND MECHANISM OF INJURY.

Characteristics (Age + MOI)	Stem Fractures Femur, N = 40 (%)				TOTAL
	<1 year	15 years	6-10 years	11 - the age of skeletal maturation	
High Energy Trauma	1 (2.5)	5 (10)	4 (10)	25 (62.5)	35 (87.5)
Low Energy Trauma	0 (0)	1 (2.5)	1 (2.5)	1 (2.5)	3 (7.5)
Birth Trauma	2 (5)	0 (0)	0 (0)	0 (0)	2 (5)
TOTAL	3 (7.5)	6 (15)	5 (12.5)	26 (65)	40 (100)

The management of femoral shaft fractures in children consists of conservative and surgical therapy. This therapy is determined based on the age and the mechanism of occurrence as shown in Table 3. In the high-energy femur fractures trauma there are 10 samples with a percentage of 66.7% that were treated conservatively with distribution in the age group <1 year are 1 sample with a percentage of 10%, the age group 1-5 years amounted to 5 samples with a percentage of 50%, and 6-10 years age group of 4 samples with a percentage of 40%. While the high energy femur fractures trauma which was treated with surgery are as much as 25 samples with a percentage of 100% only in the age group of 11 years. In the low-energy femur fractures trauma, there are 3 samples which treated conservatively with a percentage of 20% with the distribution of the age group 1-5 years old, 6-10 years age group and age 11 years group each have one sample with the percentage of 33.3%. There is no low-energy femur fracture trauma which treated operatively. And for the distribution of birth trauma, there are 2 samples with a percentage of 5%. When differentiating total amount based on conservative therapy and surgical therapy there are 15 samples with a percentage of 37.5% in the conservative therapy and 5 samples with a percentage of 62.5% for the surgical therapy. Total samples obtained are 40 samples.

TABLE III: DISTRIBUTION AND THERAPEUTIC CHARACTERISTICS OF PEDIATRIC PATIENTS WITH FEMORAL SHAFT FRACTURES BY AGE CLASSIFICATION AND MECHANISM OF INJURY.

Characteristics (Age + MOI)	Stem Fractures Femur (N = 40) n (%)		TOTAL
	Conservative therapy	Surgery therapy	
High Energy Trauma		10 (66.7)	35 (87.5)
	<1 year	1 (10)	1 (2.9)
	15 years	5 (50)	5 (14.3)
	6-10 years	4 (40)	4 (11.4)
	11 - the age of skeletal maturation	0 (0)	25 (71.4)
Low Energy Trauma		3 (20)	3 (7.5)
	<1 year	0 (0)	0 (0)
	15 years	1 (33.3)	1 (33.3)
	6-10 years	1 (33.3)	1 (33.3)
	11 - the age of skeletal maturation	1 (33.3)	1 (33.3)
Birth Trauma	2 (100)	0 (0)	2 (5)
TOTAL	15 (37.5)	5 (62.5)	40 (100)

IV. DISCUSSION

In this study, there are more men with 28 (70%) samples than female which amounted to 12 (30%). These data are also consistent with studies by Hedstrom et al who found that the incidence of fractures is more common in boys than girls by a ratio of 3: 1.4. This difference can be explained by the developments in behavior between boys and girls from school age through adolescence, this differences includes lifestyle, activities, and habits.⁹ This is also supported by other literature, according to T. Price et al in Paediatric Orthopaedics that the boy had 40% risk to fracture while girls are only had 25% risk to fracture, and this occurs in children younger than 16 years.¹⁸

The age group of 11- skeletal maturation age has the greatest frequency, while <1 year age group had the smallest frequency among all age groups. The cause of femoral shaft fractures depends on the age, which in infants whose femur are relatively weaker are more susceptible to fractures caused by the load. At the age of pre-school and school, femur fracture is usually caused by a low-speed accident such as falling from a height. Whereas in adolescents, along with the growth and strength of the femur, femur fractures are more commonly caused by trauma such as high-speed traffic accident.¹⁰

Therapy is affected by injury-related trauma, fractures types, age, family problems, and cost.¹⁶ From the research, femur fracture cases of children younger than 11 years which caused by high or low-energy mechanism are usually treated conservatively, while over the age of 11 years with high energy mechanisms of injury are mostly treated with surgery.¹⁶ This is consistent with the results of a recent study of members of the Paediatric Orthopaedic Society of North America show that surgical therapy is the preferred treatment for children older (teens) because it enables rapid mobilization, especially those with high energy trauma and for children under 11 years of age to use conservative therapy.¹⁶ These data are also consistent with studies done by John et al as the preferred therapy and most cost-effective for children aged pre-school.¹⁷

V. CONCLUSION

Based on the research that has been done, it can be concluded that the fracture of the femur shaft has certain characteristics based on the age variable, type, and configuration of the fracture and mechanism of injury. This characteristic is very important in determining the selection of the necessary treatment for femoral shaft fracture in children. Based on these results, the supervision of all activities of children needs to be improved in order to avoid the occurrence of fractures that cause high morbidity. Health service givers need to improve communication and education of the public to provide information related to the dangers of femoral shaft fractures that can cause serious complications for children. With this research, we also realize the need to do further prospective research on the same topic with more samples so the results obtained are more showing the actual characteristics and obtain more accurate results.

REFERENCES

- [1] Nicky A. Efektivitas Latihan Kekuatan Otot Terhadap Kemampuan Mobilisasi Klien Dengan Fraktur Di Ruang Rawat Anggrek Tengah Kanan RSUP Persahabatan. FKIK UI Depok. 2013.
- [2] Kuschithawati S, Magetsari R, Ng Nawati. Faktor Risiko Terjadinya Cedera Pada Anak Usia Sekolah Dasar. Berita Kedokteran Masyarakat, Yogyakarta. 2007. h.131-14.
- [3] World Health Organization. World Report on Child Injury Prevention. p.101-103 [cited children and adolescents: Increased incidence over the past decade: a population-based study from northern Sweden. Acta Orthopaedica. 2010. h.148-153.
- [4] Eroschenko P victor. Di Fiore's Atlas of Histology with Functional Correlations. Edisi ke-9. Jakarta: EGC. 2003.
- [5] Rasjad C. Pengantar Ilmu Bedah Ortopedi. Jakarta: PT. Yarsif Watampone. 2007.
- [6] General Principals of Open Fracture. 2009 [cited 2009 May 12] Available from: www.medscape.com
- [7] Solomon L, Warwick D, Nayagam S. Apley's System of Orthopaedics and Fractures. Edisi ke-8. Oxford University: New York, USA. 2001.
- [8] Ganong W.F. Buku Ajar Fisiologi Kedokteran. Edisi ke-22. Jakarta: EGC. 2008.
- [9] Engelhardt PW, Benson M, Fixsen J, Macnicol M, Parsch K. Femoral Neck Fracture In: Children's Orthopaedics and Fractures. Third Edition. London: Springer. 2010. h.759- 764.

- [10] Benson M, Fixsen J, MacNicol M, Parsch K. Femoral Shaft Fracture In: Children's Orthopaedics and Fractures. Third Edition. London: Springer. 2010. h.765-771.
- [11] Meals A. 2006. Overgrowth of the femur following fractures in children: influence of handedness. *J Bone Joint Surg Am.* 1979;61(3):381-4.
- [12] Rang M. Children's Fractures. Edisi ke-2. Philadelphia: JB Lippincott. 2004.
- [13] Rewers A. 2005. Childhood femur fractures, associated injuries, and sociodemographic risk factors a population-based study. *Pediatrics*;115(5):e543-e552.
- [14] Salter, Robert B. Chapter 16 Specific Fractures and Joint Injuries in Children. Textbook of Disorders and Injuries of the Musculoskeletal System: An Introduction to Orthopaedics, Fractures, and Joint Injuries, Rheumatology, Metabolic Bone Disease, and Rehabilitation. Edisi ke-3. Lippincott Williams & Wilkins: USA. 2001.
- [15] Helmi, Z.N. Buku Ajar Gangguan Muskuloskeletal. Jakarta:Salemba Medika. 2012.
- [16] Sanders JO, Browne RH, Mooney JF, et al: Treatment of femoral fractures in children by pediatric orthopedists: Results of a 1998 survey. *J Pediatr Orthop* 2001;21:436-441.
- [17] Flynn, John & Schwend, Richard M. Management of Pediatric Femoral Shaft Fractures. *Journal of the American Academy of Orthopaedic Surgeons*, 24: 347-355. 2004.
- [18] Price A Sylvia, Wilson M Lorraine. Pathophysiology: Clinical Concepts of Disease Processes. Edisi ke-6. Jakarta: EGC. 2005.