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Profile of Colles Fracture Patients at Dr. Soetomo General Hospital

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ABSTRACT

Colles fracture is the most common wrist fracture, with a incidence of 24% among the working population, where fracture through the radius cause the distal part to be displaced radially dan dorsally. These fractures of the distal radius are often caused by a fall on the outstretched hand with the wrist in dorsoflexion, causing tension on the volar aspect of the wrist, causing the fracture to extend toward the back of the hand. The incidence of Colles fracture is most common in adults over the age of 50 years and more common in women then men because of the onset of postmenopausal osteoposrosis where falls with outstretched arms are the most common cause. The purpose of this study was to determine the profile of patients with Colles fracture at Dr Soetomo Hospital Surabaya for the period January 2019 – 2020. This research is a descriptive study with a cross-sectional approach that takes secondary data. In this study, there were 121 case samples after the inclusion and exclusion criteria were carried out. The conclusion of this study, based on the Frykman classification, Colles fracture moat often occur in Frykman 1. Based on the age, Colles fracture most often occur in late elderly patients, namely at the age of 56-65 years. According to mode of injury, Colles fracture are the most common in patients who fall. Based on the treatment given to the patient, most Colles fracture patients were treated with a combination of operative and conservative.

Keywords: colles fracture; profile

INTRODUCTION

Background

Fractures of the distal radius are 15% of all incident fractures in adults. An epidemiological survey conducted in Sweden found that 74.5% of the total number of fractures in the forearm were fractures of the distal radius[(1)]. According to the Ministry of Health in 2012, Indonesia is now among the top five countries with the highest number of extra-articular fractures, dorsal displacement of the distal radius, dorsal angulation, radial displacement, and radial shortening.

Colles fracture is the most common wrist fracture, with an incidence of 24% among the working population, where fractures through the radius cause the distal part to be displaced radially and dorsally. The incidence of Colles fracture most often occurs in adults over the age of 50 years and is more common in women compared to men because of the onset of postmenopausal osteoporosis where falls with outstretched arms are the most frequent cause[(2)]. In a study by Nellans, Kowlaski and Chung 2012, also stated that children and adolescents are at a very high risk level for distal fractures. This is caused by very high activity during play or sports activities. In old age, it is often caused by falling when standing or sitting due to decreased energy[(3)].

Complications from a Colles fracture can be classified into early and late and can range from mild effects to significant long-term disability. Dangerous early complications include compartment syndrome, median nerve injury, and vascular injury. Acute and long-term complications that can occur include carpal tunnel syndrome and osteoarthritis. Malunion occurs if repositioning of the fracture fails, which can lead to tendon injury and lead to chronic wrist pain[(4)]. Other complications that can arise include tearing of the extensor pollicis longus,

posttraumatic sympathetic reflex dystrophy, nerve disorders (especially the median nerve), finger and shoulder stiffness, radiocarpal arteritis, and associated scaphoid fractures[2]. In addition, there are social impacts of these fractures including expensive medical costs, delays in school activities, work, inability to be independent, and long-term disability[5].

In the last century, most distal fractures in adults were treated conservatively, with reduction of the fracture when fixed, and stabilization in plaster casts or other external supports. This has resulted in efforts to develop other strategies involving surgery aimed at more accurate risk reduction and more reliable sterilization[6]. Unstable Colles fractures should be treated with reduction. Functional results were obtained very well in 48 patients (53.33%), good in 36 (40%), and adequate in 6 (6.67%)[7].

The increasing number of elderly people, especially women in Indonesia, has the potential to increase the risk of this type of fracture. Therefore, in this study, the writer would like to describe the profile of the Colles fracture at Dr Soetomo Hospital Surabaya for the period January 2019 - 2020.

Statistical data on Colles fractures are needed in order to find out the highest number of patients and ages at Dr Soetomo Hospital in the period January 2019 – 2020.

Purpose

To determine the profile of patients with Colles fracture at Dr Soetomo Hospital Surabaya for the period January 2019 - 2020.

METHODS

This is a descriptive study with cross sectional design. The study is conducted in Orthopedic Clinic Dr. Soetomo General Hospital Surabaya from January to December 2020.The population of this study is all patients with Colles fracture in the orthopedic clinic of Dr. Soetomo General Hospital, Surabaya. All patients with Colles fracture for the period January 2019 – 2020 at the orthopedic poly Dr. Soetomo General Hospital Surabaya are included for the samples, while patients with incomplete medical record data are excluded from this study. Samples are collected using total sampling technique. The variables in this study are the clinical profile of the patient, including classification, age, gender, cause and type of therapy at the orthopedic polyclinic. Data are collected by using secondary data, from medical records. This variable uses ordinal scale. The data is analysed descriptively. The inclusion criteria in this study were all patients with Colles fracture for the period of January 2019 – 2020 at the orthopaedic polyclinic of RSUD Dr. Soetomo Surabaya. The exclusion criteria in this study were the patients of Colles fracture with incomplete medical record data for the period of January 2019 – 2020 at the orthopaedic polyclinic of RSUD Dr. Soetomo Surabaya.

RESULTS

Distribution of Colles Fractures by Age

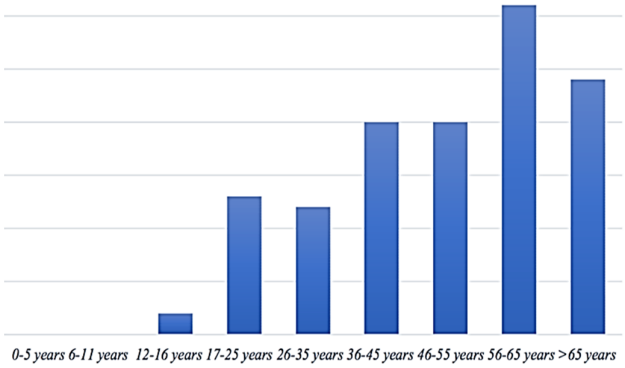

Figure 1. Distribution of colles fractures by age

A total of 121 patients met the pre-determined inclusion criteria. Most cases of fracture were found in the late elderly age group (56–65 years), which was 31 cases (31/121; 25.62%). The elderly age group (>65 years) occupied the second most cases with 24 cases (24/121; 19.83%), followed by late adults (36-45 years) with 20 cases (20/121; 16.53%), elderly early (46 – 55 years) with 20 cases (20/121; 16.53%), late adolescence (17-25 years) with 13 cases (13/121; 10.74%), early adulthood (26 – 35 years) with 12 cases (12/121; 9.91%), and early adolescents (12-16 years) with 2 cases (2/121; 1.65%).

Distribution of Colles Fractures by Gender

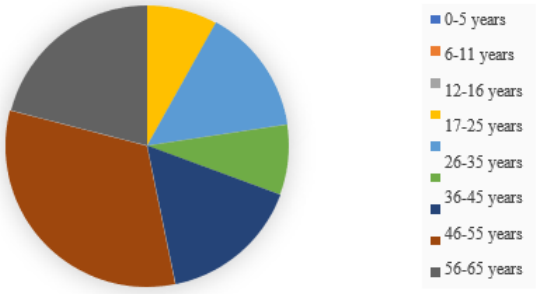

Figure 2. Distribution of colles fractures in female

This study found that the incidence of Colles fracture was more common in female patients with 62 cases (62/121; 51.24%). In the female group, the most cases were found in the late elderly age group as many as 20 cases (20/62; 32.26%), followed by seniors with 13 cases (13/62; 20.97%), early elderly with 10 cases (10/62; 16.13%), early adulthood with 9 cases (9/62; 14.51%), late adulthood with 5 cases (5/62; 8.06%), and late adolescence with 5 cases (5/62; 8.06%).

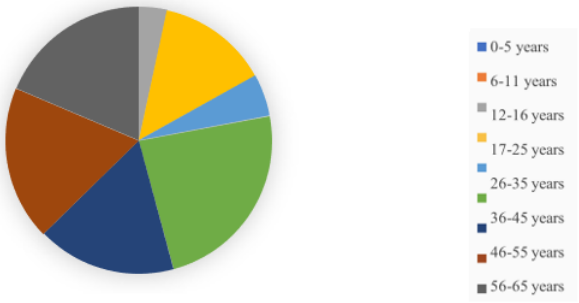

Figure 3. Distribution of colles fractures in male

Meanwhile, in the male group, the most dominant cases were found in the late adult age group with 14 cases (14/59; 23.73%), followed by the elderly with 11 cases (11/59; 18.64%), late elderly with 11 cases (11/59; 18.64%), early elderly with 10 cases (10/59; 16.95%), late adolescents with 8 cases (8/59; 13.56%), early adults with 3 cases (3/59; 5.08%), and early adolescents with 2 cases (2/59; 3.39%).

Distribution of Colles Fractures by Frykman Classification

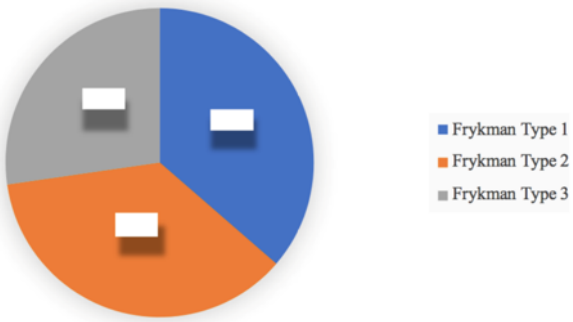

Figure 4. Distribution of colles fractures by Frykman classification

This study found three types of fractures according to Frykman's classification, namely Frykman type 1, type 2, and type 3. The most common cases were Frykman type 1 (44/121 cases; 36.36%) and 2 (44/121 cases; 36 cases). .36%), and followed by type 3 (33/121 cases; 27.27%).

Table 1. Distribution of colles fractures by Frykman classification

Variable	Colles fracture type					
	Frykman 1		*Frykman* 2		*Frykman* 3	
	n	%	n	%	n	%
Gender						
Male	23	52.27%	21	47.73%	17	51.52%
Female	21	47.73%	23	52.27%	16	48.48%
Age Group						
Toddler, 0-05 years	-	-	-	-	-	-
Child, 6-11 years	-	-	-	-	-	-
Early adolescent, 12-16 years	2	4.55%	2	4.55%	-	-
Late adolescent, 17-25 years	4	9.09%	6	13.64%	3	9.09%
Early adult, 26-35 years	8	18.18%	-	-	1	3.03%
Late adult, 36-45 years	5	11.36%	5	11.36%	10	30.30%
Early elderly, 46-55 years	5	11.36%	8	18.18%	7	21.21%
Late elderly, 56-65 years	12	27.27%	12	27.27%	7	21.21%
Elderly >65 years	8	18.18%	11	25.00%	5	15.15%
Mode of Injury						
Fall	24	54.55%	26	59.09%	20	60.61%
Traffic Accident	20	45.45%	18	40.91%	12	36.36%
Work Accident	-	-	-	-	1	3.03%

In the Frykman type 1 group, the cases were dominated by female patients (23/44 cases; 52.27%). The cases in this group were found to be highest in the late elderly age group (12/44 cases; 27.27%), followed by seniors (8/44 cases; 18.18%), early adults (8/44 cases; 18.18 cases). %), early elderly (5/44 cases; 11.36%), late adulthood (5/44 cases; 11.36%), late adolescents (4/44 cases; 9.09%), and early adolescents (2 /44 cases; 4.55%). Meanwhile, the most frequent mode of injury (MOI) was due to falls (24/44 cases; 54.54%) and the rest was due to traffic accidents.

In the Frykman type 2 group, the cases were dominated by female patients (23/44 cases; 52.27%). The cases in this group were found to be highest in the late elderly age group (12/44 cases; 27.27%), followed by seniors (11/44 cases; 25.00%), early elderly (8/44 cases; 18.18 cases). %), late adolescents (6/44 cases; 13.36%), late adults (5/44 cases; 11.36%), and early adolescents (2/44 cases; 4.55%). Meanwhile, the most frequent mode of injury (MOI) was due to falls (26/44 cases; 59.09%) and the rest due to traffic accidents.

In the Frykman type 3 group, cases were dominated by male patients (17/33 cases; 51.52%). The cases in this group were found to be highest in the late adult age group (10/33 cases; 30.30%), followed by the late elderly (7/33 cases; 21.21%), early elderly (7/33 cases; 21, 21%), seniors (5/33 cases; 15.15%), late teens (3/33 cases; 9.09%), and early adults (1/33 cases; 3.03%). Meanwhile, the most frequent modes of injury (MOI) were falls (20/33 cases; 60.61%), KLL (12/33 cases; 36.36%), and work accidents (1/ 33 cases; 3.03%).

Distribution of Colles Fractures by Mode of Injury

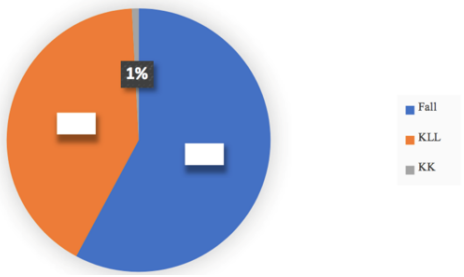

Figure 4. Distribution of colles fractures by mode of injury

The MOI of Colles fracture in the study was most commonly caused by a fall with 70 cases (70/121; 57.85%), followed by 50 cases (50/121; 41.32%) KLL, and 1 case (1/121; 0 ,83%) KK. In the MOI falls, the main cases are the elderly (24/70 cases; 34.29%), followed by the late elderly (18/70 cases; 25.71%), early elderly (14/70 cases; 20.00%), late adults (10/70 cases; 14.29%), early adults (2/70 cases; 2.86%), and early adolescents (2/70 cases; 2.86%). Meanwhile, according to gender, cases of falls were dominated by male patients (36/70 cases; 51.43%).

Table 2. Distribution of colles fractures by mode of injury

Variable		Mode of injury					
		Fall		Traffic accident		Work accident	
		n	%	n	%	n	%
Gender							
	Male	36	51.43%	22	44.00%	1	100.00%
	Female	34	48.57%	28	56.00%	-	-
Age Group							
	Toddler, 0-05 years	-	-	-	-	-	-
	Child, 6-11 years	-	-	-	-	-	-
	Early adolescent, 12-16 years	2	2.86%	-	-	-	-
	Late adolescent, 17-25 years	-	-	13	26.00%	-	-
	Early adult, 26-35 years	2	2.86%	9	18.00%	-	-
	Late adult, 36-45 years	10	14.29%	9	18.00%	1	100.00%
	Early elderly, 46-55 years	14	20.00%	6	12.00%	-	-
	Late elderly, 56-65 years	18	25.71%	13	26.00%	-	-
	Elderly >65 years	24	34.29%	-	-	-	-

In traffic accident, the main cases were dominated by late adolescent patients (13/50 cases; 26.00%) and late elderly (13/50 cases; 26.00%), followed by early adults (9/50 cases; 18.00%), adults late (9/50 cases; 18.00%), and early elderly (6/50 cases; 12.00%). Meanwhile, according to gender, traffic accident cases were dominated by female patients (28/50 cases; 56.00%). Meanwhile, for one case of work accident, it was a late adult male patient.

Distribution of Colles Fractures by Procedure

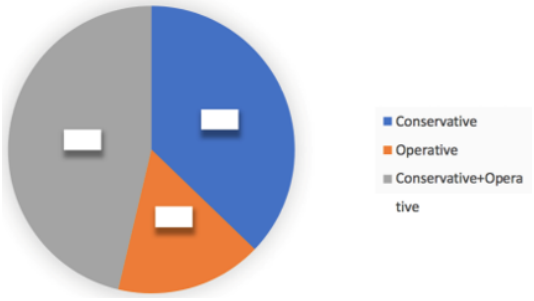

Figure 4. Distribution of colles fractures by procedure

As for the procedure of Colles fracture, the combination of operative and conservative was the most frequently performed (56/121 cases; 46.28%), followed by conservative measures (45/121 cases; 37.19%), and operative (20/21). 121 cases; 16.53%). In cases with a combination of operative and conservative measures, late elderly patients contributed the most cases (14/56 cases; 25.00%), followed by late adolescents (12/56 cases; 21.43%); late adults (10/56 cases; 17.86%), early adults (9/56 cases; 16.07%), early elderly (6/56 cases; 10.71%), seniors (5/56 cases; 8 ,93%). In the combined action group, the most fractures were Frykman 1 (23/56 cases; 41.07%), Frykman 2 (19/56 cases; 33.93%), and Frykman 3 (14/56 cases; 25.00%).

Table 3. Distribution of colles fractures by procedure

Variable	Procedure					
	Conservative		Operative		Conservative + Operative	
	n	%	n	%	n	%
Age Group						
Toddler, 0-05 years	-	0.00%	-	-	-	-
Child, 6-11 years	-	0.00%	-	-	-	-
Early adolescent, 12-16 years	2	4.44%	-	-	-	-
Late adolescent, 17-25 years	1	2.22%	-	-	12	21.43%
Early adult, 26-35 years	-	-	2	10.00%	9	16.07%
Late adult, 36-45 years	7	15.56%	3	15.00%	10	17.86%
Early elderly, 46-55 years	9	20.00%	5	25.00%	6	10.71%
Late elderly, 56-65 years	11	24.44%	6	30.00%	14	25.00%
Elderly >65 years	15	33.33%	4	20.00%	5	8.93%
Colles Fracture Type						
Frykman 1	13	28.89%	8	40.00%	23	41.07%
Frykman 2	20	44.44%	5	25.00%	19	33.93%
Frykman 3	12	26.67%	7	35.00%	14	25.00%

In cases with conservative measures, elderly patients contributed the most cases (15/45 cases; 33.33%), followed by the late elderly (11/45 cases; 24.44%); early elderly (9/45 cases; 20.00%), late adulthood (7/45 cases; 15.56%), early

adolescents (2/45 cases; 4.44%); late adolescents (1/45 cases; 2.22%). As for the conservative treatment group, the most fractures were Frykman 2 (20/45 cases; 44.44%), Frykman 1 (13/45 cases; 28.89%), and Frykman 3 (12/45 cases; 26.67%).

Meanwhile, in cases with combined surgery, late elderly patients contributed the most cases (6/20 cases; 30.00%), followed by early elderly (5/20 cases; 25.00%); seniors (4/20 cases; 20.00%), late adulthood (3/20 cases; 15.00%), early adults (2/20 cases; 10.00%). In the operative group, the most fractures were Frykman 1 (8/20 cases; 40.00%), Frykman 3 (7/20 cases; 35.00%), and Frykman 2 (5/20 cases; 25.00%).

DISCUSSION

The incidence of Colles fracture in this study was mostly found in the 56-65 year age group, with a total of 31 (26%). This is in line with research conducted by Jerrhag, D., et al (2017) which stated that in 31,223 most Colles fractures were found in the 60-69 year age group with a rate of 16,181 (52%)[8]. This incidence of Colles fracture is most common in adults over the age of 50 years and is more common in women than men because of the onset of postmenopausal osteoporosis where falls with outstretched arms are the most frequent cause. In a study conducted by Bergh, C. et al (2020) also showed the same thing, where in fractures of the distal radius the average age was 59.8 years from 1,186 patients[9].

Parents are one part of the community that requires special attention. This is due to the high number of disabilities that are often caused by falls. The pathophysiology of why this can happen is explained in a study conducted by Bergh, C. et al (2020) where it is stated that as a person's age increases, it can cause a decrease in activity, even though it is important to form bone mass density due to the remodeling process. lasts a lifetime. This is evidenced by x-ray images that show a decrease in the thickness of the cortex of the bone, so that when someone with old age falls or has a minor injury, they are more at risk of fracture[9].

Old age is indeed a major predisposition for falls and traffic accidents due to a decrease in physiological capacity due to the aging process [10,11]. Increasing age and the progression of the aging process causes various decreases in the physical and psychological abilities of individuals, making them prone to falls and the resulting physical consequences. This was also confirmed in this study which showed an increase in fracture cases with age. Predisposing susceptibility to falls and the decrease in bone density that is often found in the elderly can explain the increasing prevalence of Colles fractures with age. In addition, at least half of the total fracture cases occur in individuals of productive age (53.72% of cases are in the age range 17-55 years) where the high activity and mobility of this age group can be a major contributor to traffic accidents, in line with the findings in Iran which shows an inverse relationship between age and the number of accidents per year[12]. This explanation is also in accordance with the findings of this study, namely 41.32% of the total cases were traffic accidents.

Based on the results of this study, the incidence of Colles fracture was mostly found in the female sex, with a total of 61 (51%) followed by the male sex as much as 59 (49%). The results of this study are in line with the survey conducted by Nugroho, Bayusentono and Rehatta (2017)[13]. Based on the data in this study, women had a higher incidence of Colles fracture with 25 patients (67.6%) than men with 12 patients (31%). In a study conducted by Azad, A., et al (2019) showed similar results. It was stated that the incidence of fracture of the distal radius had a ratio of 4.88:3[14]. Rundgren, et al (2020) stated that in 22,962 Colles fracture patients in Sweden the majority were women aged 60-69 years, amounting to 12,368 (82%)[15].

Women have a higher risk of fracture than men due to the menopause process. This is because the process of primary osteoporosis is due to hormonal processes, especially estrogen and calcium and vitamin D intake in individuals which can lead to pathological fractures[16]. At menopause, the normal bone remodeling cycle is disrupted due to estrogen receptors in the body). Osteoclast cells that function in resorption are increased, while osteoblast activity is decreased. As a result, the amount of bone absorbed exceeds the amount stored which causes a loss of bone density[17]. In addition, when a person falls and bones in the hands that supports osteoporosis has occurred, it will increase the risk of fractures.

The highest incidence of Colles fractures in this study was obtained by classification of fractures according to Frykman 1 and 2, each with a total of 44 (36%). Followed by the Frykman 3 classification as many as 33 (27%). While in a study conducted by Marinelli, Frykman fractures were the most with type 3 which amounted to 18 people (19.35%) followed by Frykman type 2 with a total of 11 (11.83%)[18].

Frykman 1 is the simplest fracture in terms of mechanism and impact because it only involves extra-articular than Frykman 4 [18]. This is one of the reasons why there are more Frykman 1 and 2 species than other Frykman types.

Colles fracture MOI in this study was most often caused by falls with 70 cases (57.85%), followed by 50 cases (41.32%) traffic accidents, and 1 case (0.83%) work accidents. This is different from the research conducted by Nugroho, Bayusentono and Rehatta (2017) where more traffic accidents were obtained with 16 cases (43.2%)[13]. Research conducted by Tantri et al., (2019) showed the same thing. In 677 cases, the most common cause was traffic accidents with a total of 322 cases (47.26%) followed by falls at the same height with a total of 116 cases (17.1%)[19].

The different results are due to different age groups. In previous studies, the most age groups were teenagers with a range of 20-29 years, while in this study the most were found in the 56-65 year age group. The age difference causes different MOI, where the productive age is more active in driving compared to the late elderly age. The risk of falling is also higher in the elderly according to Armany, V. (2017) due to impaired balance or gait, dizziness or vertigo, orthostatic hypotension and visual disturbances[20].

The highest incidence of Colles fractures in this study was obtained by classification of fractures according to Frykman 1 and 2, each with a total of 44 (36%). Followed by the Frykman 3 classification as many as 33 (27%). While in a study conducted by Marinelli (2019) Frykman fractures were the most with type 3 which amounted to 18 people (19.35%) followed by Frykman type 2 with a total of 11 (11.83%)[18].

Frykman 1 is the simplest fracture in terms of mechanism and impact because it only involves extra-articular than Frykman 4 [18]. This is one of the reasons why there are more Frykman 1 and 2 species than other Frykman types. Bearing in mind also that Dr. Soetomo General Hospital is a Type A hospital, so milder cases may have been resolved at the lower level of health services, such as type B or C hospitals. This is in line with the findings of this study which showed that the number of cases was directly proportional to the age of the patient. who tend to require operative management (62.81%) because cases requiring only conservative treatment may have been resolved in type B or lower type hospitals. The cases that did occur in areas close to Dr. Seotomo General Hospital may also contribute to the overall case given the location of this hospital in the second largest city in Indonesia, where traffic and work accidents are quite frequent.

CONCLUSION

Based on the results of the research that has been carried out, it is concluded from the profile of Colles fracture patients at Dr Soetomo Hospital in the period January 2019 - January 2020: Based on the Frykman classification, Colles fractures most often occur in Frykman 1. Frykman 1 is the simplest fracture in terms of mechanism and impact because it only involves extra-articular than Frykman 4. This is one of the reasons why there are more Frykman 1 than other Frykman types. Based on age, Colles fractures most often occur in elderly patients The end is at the age of 56-65 years. According to the modes of injury, Colles fractures are most common in patients who fall. Based on the treatment given to the patient, most Colles fracture patients are treated with a combination of operative and conservative treatment. Many operative actions were carried because RSUD Dr. Soetomo is a type A hospital which is a reference in the East Java region, so mild cases have been resolved at the lower level of health service such as type B and C hospitals. After surgery, the patient also requires conservative therapy for rehabilitation. This explains why combination therapy is more widely used in this study. Further research is needed using primary data to get accurate results.

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