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The Assessment of Combined Upper Limb Surgical Results at 7A Military Hospital in the Period of 2015-2017

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Abstract
The study on 151 patients who had a combination of central upper limb surgery at the 7A Military Hospital found that the leading cause was traffic accidents accounting for 55.7%. The incident commonly occurred between the ages of 16 to 30 years old, accounted for 40.4%. The majority, 116 patients, accounted for 76.8%, had Group A fracture type according to AO classification. Results of the combination fracture treatment: 95.3% was excellent and good, 7.9% was average, and 1.3% was poor.Due to poor post-surgical and home caring guidance, two patients had to have surgery again, and one patient was unable to recover his limb function.We recommended having appropriate post-surgical care and home care guidance for the patients.

Keywords: *Central upper limb, Post-surgical care, Home care guidance*

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I. Introduction

Limb fractures are a common injury and occur at any age, but mostly in the working age, which accounts for 11.3 out of 1,000 people [1-6]. Limb fractures increased due to the development of transportation and the industrialization and modernization of the country, the inadequacy between infrastructures and the crowded transportation, and the inadequate work protection and workers' safety awareness. Statistic showed that in total limb fractures incidents, 30% was at the upper limb, 50% was at the lower limb, 16% at the arm, 16% at forearm, 20% at femur, and 24% at shin bone; open fracture accounted for 33% of all fractures [3]. Fractures caused by traffic accidents accounted for 50% [2]. The diagnosis of fractures is not tricky but prognosis, assess the extent of the damage, from which to choose an appropriate treatment, and minimize complications and sequelae are significant and necessary to restore the limb functions to its best. Recently, along with the modern medical development, there are several limb fractures treatment such as conservative blaster cast management, combination bone surgery (by methods such as external fixator, intramedullary nailing, Kirschner wire). In the case of proper treatment, the bone will heal in 3 to 4 weeks. However, there are still some complications during surgery, such as cavity compression, infection, muscle atrophy, stiffness, and neurological symptoms such as pain or numbness in the injured limb.

In the process of treating trauma fractures, there have been many scientific studies on clinical characteristics and treatment results. During several years of operation of the 7A Military Hospital, we have performed combination limb bone surgery for many patients. However, there has not been any subject evaluating the results of combination bone treatment. Therefore, to contribute to better care and follow-up for patients with combined upper limb surgery at the 7A Military Hospital, we conducted the research: "The assessment of combined upper limb surgical results at 7A Military Hospital l 2015-2017" aiming to evaluate the treatment results within the hospital.

II. Methods

Characteristics of limb bones

The upper limb includes pectoral girdle, humerus, ulna, radius, and metacarpals. Between the bones connected by joints and ligaments. Surrounding the limb covered with soft tissue composition.

An indirect trauma mechanism often causes the close fractures; the direct trauma encountered in a labor accident, a traffic accident, a collision, or a fire wound often causes an open fracture. A variety of treatments can be selected, and currently, the results from the conservative or surgical procedures are similar.

Subjects of the research

- We decided 151 patients with limb fractures who underwent combined fracture treatment at the 7A Military Hospital from 2015 to 2017 and patients who have undergone bone fracture surgery coming back to the hospital to remove the combined devices after six months to 1 year.
- After selecting, we collected information from their medical records using a premade questionnaires.

Patients' characteristics

- Causes of the fractures
- The fractures' location
- Characteristics of the fractures according to AO classification

*. Simple fracture A1: Spiral fracture.
A2: Oblique fracture> 30^0
A3: Transverse fracture <30^0

*. Segmental fracture: B1: spiral wedge
B2: Bending wedge
B3: Fragmented wedge

*. Complex Fracture C1: complex spiral
C2: 3 segmented fracture
C3: Irregular fracture

Assessing surgical results

- Patient's conditions in 7-10 days post-surgical treatment in the 7A Military Hospital.
- Evaluation of surgical results via post-surgery X-ray according to TerChiphorst P. [8]
  + Very good: straight shaft similar to the uninjured side.
  + Good: bending to outward or forward<5^0, or backward, inwards 10^0.
  + Average: bending outward or forward> 5^0, or bending backward or inward> 10^0.>>
  + Poor: Bending > $5^0$and limb shaft rotation.>
- The conditions and limb functions when the patients came to remove the bone combined-media, according to IOWA. [7]
- Evaluate the results of bone fracture healing via X-ray when dismantling bone-combination equipment

III. Results

Table 1: Rate of fractures according to our study

Gender / Age	MALE		FEMALE		TOTAL	
	n	%	n	%	n	%
16 - 30	57	37.7	4	2.7	61	40.4
31 - 45	37	24.5	7	4.6	44	29.1
46 - 60	33	21.9	7	4.6	40	26.5
>60	1	0.7	5	3.3	6	4.0
Total	128	84.8	23	15.2	151	100

Table 1 showed that the most common subjects were males at the age of 16 to 30 (40.4%).

Table 2: Causes of fractures according to our research

Causes	n	%
Traffic accident	84	55.7
Labor accident	36	23.9
Household accident	15	9.6
Sport accident	16	10.8
Accidents caused by fire	0	0
TOTAL	151	100

Table 2 showed that traffic accidents accounted for the highest rate (55.7%), corresponding to prior statistics.

Table 3: Classification of fractures (research results)

	Metacarpal	Radius	Ulna	Humegus	Clavicle
Quantity	17	22	27	7	78
%	11.3	14.6	17.9	4.6	51.6

Table 3 showed that the rate of clavicle fracture accounted for 56.8%, ulna, and radius fracture 29%, metacarpal 10.1%, humerus 4.1 % sililar with Awasthi*et al*., (2016) [3].

Table 4: Fracture level according to AO classification (research results)

Age	16 - 30		31 - 45		46 - 60		>60	
Fractures	n	%	n	%	n	%	n	%
A1	16	10.6	9	6	9	6	1	0.7
A2	25	16.6	21	13.9	13	8.6	3	1.9
A3	5	3.3	5	3.3	8	5.3	1	0.7
B1	9	6	7	4.6	5	3.3	1	0.7
B2	4	2.6	2	1.3	4	2.6	0	0
B3	2	1.3	0	0	1	0.7	0	0
C1	0	0	0	0	0	0	0	0
C2	0	0	0	0	0	0	0	0
C3	0	0	0	0	0	0	0	0
Total	61	40.4	44	29.1	40	26.5	6	4

Table 4 showed that A2 fractures accounted for the highest proportion (41% - 62 patients).

Figure 1: 2 segments humerus fracture

Figure 2: 2 segments ulna fracture

Table 5: X-ray evaluation of post-surgery results by TerSchiphorst P.

X-ray results	Metacarpale		Radius		Ulna		Humegus		Clavicle		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Very good	8	47	10	45.5	12	44.4	3	42.9	35	44.9	68	44.4
Gut	9	53	12	54.5	15	55.6	4	57.1	43	55.1	83	55.6
Average	0	0	0	0	0	0	0	0	0	0	0	0
Poor	0	0	0	0	0	0	0	0	0	0	0	0
Total	17	100	22	100	27	100	7	100	78	100	151	100

Table 5 showed that 100% combination treatment during hospital stay were excellent and very good.

Figure 3: Post-surgical result humerus fracture

Figure 4: Post-surgical result ulna and radius fractures

Table 6: The development of incisions

Results	Metacarpale		Radius		Ulna		Humegus		Clavicle		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Primary intention healing	17	100	22	100	27	100	7	100	76	97.4	149	98.7
Superficial Infections	0	0	0	0	0	0	0	0	2	2.6	2	1.3
Deep Infections	0	0	0	0	0	0	0	0	0	0	0	0
Total	17	100	22	100	27	100	7	100	78	100	151	100

Table 6 showed that there were 149 cases with primary intention healing on the surgery incision, which accounted for 98%.

***Table 7: X-ray evaluates of post-surgery results by Terschiphorst P.* when the patient came to remove the fixation equipment.**

X-ray results	Metacarpale		Radius		Ulna		Humegus		Clavicle		Total	
	N	%	n	%	n	%	n	%	n	%	n	%
Very good	6	35.3	8	36.4	10	12.8	3	42.9	28	35.9	55	36.4
Gut	10	58.8	13	59	16	20.5	4	57.1	47	60	89	58.9
Average	1	5.9	1	4.6	0	0	0	0	2	2.8	3	3.3
Poor	0	0	0	0	1	3.7	0	0	1	1.3	2	1.4
Total	17	100	22	100	27	100	7	100	78	100	151	100

Table 7 showed that the results of combination treatment when patients came to remove the combination device were mostly good and very good, accounted for 95.3%. There were 2 cases with broken fixation and nails, accounted for 1.3%.

Table 8: Evaluation of incisions when removal of bone combination equipment

Results	Metacarpal		Radius		Ulna		Humegus		Clavicle		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Good healing	17	100	21	95.5	27	100	7	100	77	98.7	149	98.7
Keloid	0	0	1	4.5	0	0	0	0	1	1.3	2	1.3
Osteitis	0	0	0	0	0	0	0	0	0	0	0	0
Total	17	100	22	100	27	100	7	100	78	100	151	100

Table 8 showed that there were 149 cases with good healing incisions, accounted for 95.3%, and 2 cases formed keloids, accounted for 1.3%.

Table 9: Evaluation of function recover according to IOWA

X-ray results	Metacarpal		Radius		Ulna		Humegus		Clavicle		Total	
	N	%	n	%	n	%	n	%	n	%	n	%
Very good	10	58.8	11	50	16	59.3	4	57.1	44	56.4	85	56.3
Good	6	35.3	8	36.3	9	33.3	3	42.9	26	33.3	52	34.5
Average	1	5.9	2	9.1	2	7,4	0	0	7	9	12	7.9
Poor	0	0	1	4.6	0	0	0	0	1	1.3	2	1.3
Total	17	100	22	100	27	100	7	100	78	100	151	100

Table 9 showed that the above-average function recovering treatment accounted for 98.7%. There were 11 cases need more recover training, 2 cases with the reduced level in which 1 case had broken the fixation and needed surgery again, and 1 case had nail broken after the second surgery.

IV. Discussion

Limb fractures account for a very high proportion of the population (11.3 / 1000 people); the percentage of prosthetic joints accounted for 2-3%, the rate of slow healing cases accounted for 4-5%, and the rate of post-surgery reduce or lack of limb functions high [2, 8-10].

In the scope of this research project on 151 patients who had combination upper limb surgery in the 7A Military Hospital, we found fractures that occurred at all ages, but the most commonly in working age. The most common fracture type observed through X-ray was Group A, according to AO classification. After combined surgeries, the healing rate was 100%; results when dismantling the combined bone equipment through X-ray was 98.7% (149 cases), and the rate of function recovery was 98.7% (149 cases). Thereby we found that the result of combination therapy depended very much on post-surgery and home care guidance. In 151 patients, we encountered 2 cases of unsatisfied function recover. One patient had broken the splint (because the patient had to work just three months after the surgery), and one patient broke the nail but got good post-surgery results. Function recovering training during the post-surgery period and at home is critical. That would be the focus of our research in the future.

DECLARATIONS

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