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RESEARCH ARTICLE

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Proposals and Criteria for the Evaluation of Effectiveness in Plate Osteosynthesis in Patients with Tibia Fractures

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ABSTRACT

Tibial fractures are among the most common of long bones; there is no consensus on what is the most appropriate surgical technique for their treatment; sheet osteosynthesis may be an option. The purpose of this work is to introduce criteria for evaluating the effectiveness of sheet osteosynthesis. Theoretical and empirical scientific research methods are used, these allow us to analyze the proposals and evaluate them for a better understanding of how to evaluate and with what criteria the comparison between the proposals for comparison between standard osteosynthesis surgical techniques and modified MIPO. The 50 professionals who provide their cooperation respond that complications are a very viable option to evaluate the techniques. Regarding consolidation time, it also has high priority as a variable for comparison between techniques. 70% of the professionals interviewed consider that the 7% decrease in total complications between one technique and another is a value to be taken into account when comparing them. Regarding the decrease in consolidation time, all of them deliberate that it can be considered a variable of response, but 66% consider the variation of three or more weeks relevant. It is concluded that the proposals for effectiveness evaluation variables and the criteria used can be generalized to other works.

Keywords: Osteosynthesis with Blade, Comparison and Effectiveness Criteria

Introduction

Tibial fractures are among the most common of long bones. They are health conditions that have a negative impact on the quality of life of patients who suffer from them. In addition to the complications and consequences that the condition presents, it severely hinders the ability to walk, resulting in prolonged or permanent disability [1].

Tibial fractures are common conditions in Orthopedics and Traumatology services; there is no consensus on what is the most appropriate surgical technique for their treatment; Modified minimally invasive plate osteosynthesis would achieve an improvement in patient outcomes. The use of these techniques requires evaluating the results, but currently there are few published works on the criteria to be used in evaluating the effectiveness of one technique over another.

Minimally invasive osteosynthesis with plate and screws is a good option for tibia fractures; with good clinical-functional evolution and few complications when compared to open surgery [2].

There are no criteria for evaluating the effectiveness of the surgical treatment of tibia fractures using sheet osteosynthesis, whether with the standard open sheet osteosynthesis technique, minimally invasive MIPO with modifications, and other sheet osteosynthesis techniques.

The purpose of this work is to introduce criteria for evaluating the effectiveness of sheet osteosynthesis.

Method

We used an interview method for a group of orthopedic professionals made up of professionals from different groups with a common variable, the three groups belong to the research project of the Mártires del 9 de Abril General University Hospital.

Declaration of focus group members, it is made up of 14 members, all specialists in orthopedics and traumatology from the services of the northern center of the province.

Declaration of nominal group members, it is made up of five high-class specialists, all with more than 30 years in the specialty.

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Expert statement, this group is made up of 31 members of the Cabana Orthopedic Society who belong to eight provinces of the country, with the category of first and second degree specialists.

Theoretical and empirical scientific research methods are used, these allow us to analyze the proposals and evaluate them for a better understanding of how to evaluate and with what criteria the comparison between the proposals for comparison between standard osteosynthesis surgical techniques and modified MIPO.

The information was entered into a database and statistical methods were applied to compare the results, which in the end were entered into contingency tables and analyzed in comparison with other authors.

Results

Table 1 presents the variables that researchers consider to be the most appropriate proposals to evaluate the effectiveness of one technique over another. For the three groups, complications are the best way to compare how the types of osteosynthesis evolve.

The 50 professionals who provide their cooperation respond that complications are a very viable option to evaluate the techniques. Regarding consolidation time, it also has high priority as a variable for comparison between techniques.

Regarding the size of the incisions and the surgical time as variables that can be used to compare the techniques, the professionals interviewed no longer provide a satisfactory majority consensus, 80% propose the size of the incisions and justify it thanks to the better aesthetic acceptance of the patients and the decrease in hospital expenses, surgical time as a variable to compare osteosynthesis techniques with blade is considered as a response variable to effectiveness by 70% of professionals.

Table 1: Proposals for effectiveness variables to compare the surgical technique of osteosynthesis with blade

Proposals for effectiveness variables to compare osteosynthesis with sheet	Focus group				Control group				Expert group				Total			
	Relevant		No Relevant		Relevant		No Relevant		Relevant		No Relevant		Relevant		No Relevant	
Complications	14	28	-	-	5	10	-	-	31	62	-	-	50	100	-	-
Consolidation time	14	28	-	-	5	10	-	-	30	60	1	2	49	98	1	2
Incision size	11	22	3	6	4	8	1	2	25	50	6	12	40	80	10	20
Surgical time	10	20	4	8	3	6	2	4	24	48	7	14	35	70	13	26

Fountain. Database (Interview with professionals).

Table 2 evaluates the criteria for the proposed variables with comparison features between sheet osteosynthesis techniques. 70% of the professionals interviewed consider that the 7% decrease in total complications between one technique and another is a value to be taken into account when comparing them, only five professionals consider the three percent decrease in the difference between techniques to be relevant.

Regarding the decrease in consolidation time, everyone considers that it can be considered a response variable, but 66% consider the variation of three or more weeks to be relevant. Likewise, only five professionals consider that the difference of one week between the groups is relevant.

The decrease in the size of the incisions is considered as a response variable, with a decrease of two centimeters or less remaining irrelevant; 58% consider a difference in the size of the incisions between the groups of more than five centimeters to be relevant.

The surgical time between the groups is considered irrelevant in the opinion of 12% of the professionals when it decreases less than 10 centimeters, however, more than 50% consider a variation between the groups to be relevant when using sheet osteosynthesis when the difference is greater than 15 centimeters.

Table 2: Criteria for evaluating effectiveness when comparing surgical techniques of osteosynthesis with blade

Criteria for evaluating effectiveness	Grupo focal				Grupo control				Grupo de expertos				Total			
	Relevante		No Relevante		Relevante		No Relevante		Relevante		No Relevante		Relevante		No Relevante	
	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
Reduction in the number of complications-Less	2	4	-	-	1	2	-	-	2	4	-	-	5	10	-	-
than 3% Between	4	8	-	-	1	2	-	-	5	10	-	-	10	20	-	-
3-6% More than 7%	8	16	-	-	3	6	-	-	24	48	-	-	35	70	-	-
Decrease in consolidation time																
One week	1	2	-	-	1	2	-	-	3	6	-	-	5	10	-	-
Two weeks	4	8	-	-	1	2	-	-	7	14	-	-	12	24	-	-
Three or more weeks	9	18	-	-	3	6	-	-	21	42	-	-	33	66	-	-
Decrease in the size of incisions																
less than 2cm	1	2	1	2	1	2	1	2	2	4	2	4	5	10	3	6
Between 3 and 4 cm	3	6	1	2	1	2	-	-	3	6	2	4	6	12	4	8
More than 5 cm	6	12	2	4	2	4	-	-	19	38	3	6	29	58	3	6
Reduction in surgical time																
less than 10 minutes	1	2	2	4	-	-	-	-	2	4	4	8	3	6	6	12
Between 10 and 15 minutes	3	6	1	2	1	2	1	2	4	8	2	4	8	16	4	8
More than 15 minutes	6	12	1	2	2	4	1	2	18	36	1	2	26	52	3	6

Fountain. Database (Interview with professionals).

Discussion

According to Fesher et al, from a biomechanical point of view, fracture healing is defined as the restoration of the mechanical properties of the affected bone, such as strength, resistance and rigidity [3]. When these properties are not restored, we can be faced with three different scenarios; malunion or malunion, occurs when the fracture consolidates, but does so in a pathological position due to angulation or rotation of the ends or joint incongruity; delayed union or delayed union: the bone healing process takes longer than expected for the type and location of the fracture, usually more than 3-6 months, and pseudarthrosis or nonunion: when the healing process fails and Callus formation does not occur.

Reyes Rebolledo, in his work, uses the percentage of patients who present early and late complications as a determining factor for effectiveness [4].

Burgos Pineda5 uses the duration of surgery and consolidation time as criteria to measure effectiveness in his comparison between the MIPO technique and the standard open sheet technique.

Cuban professionals use clinical and radiological criteria, based on the considerations of Morshed and Miclau to define the union of the fracture, they were used for the evaluation, from a clinical point of view, the absence of pain or sensitivity when supporting was taken into account. Weight or palpation of the physical examination. Among the radiological aspects, the fracture bridge was determined by callus, bone or trabeculae and in three cortices. These parameters were used to define the correct bone consolidation in each case [5].

When analyzing radiological consolidation, it was found that both treatments are effective; however, caution should be taken and try to avoid complications that can be fatal [6].

Professors from the Department of Orthopedics at the Bidar Institute of Medical Sciences in India conclude that open reduction and internal fixation have demonstrated higher rates of deep infection and wound dehiscence, however, the infection rate decreases dramatically with use [7]. Minimally invasive percutaneous plate osteosynthesis (MIPO) compared with ORIF [8].

Minimally invasive plate osteosynthesis minimizes soft tissue compromise while maintaining the vascular integrity of the fractured fragments and preserving osteogenic hematoma, allowing for uncomplicated fracture healing and early return to function, according to Sharma and Gulati. , offers an attractive option for the treatment of closed fractures of the tibia while preserving the blood supply to the soft tissues and bone compared to other treatment options [9].

Not all works maintain alignment with the author's approaches, authors from the Department of Orthopedics of the GMC Amritsar clinic in the Indian Punjab report in their comparative study between external fixation and MIPO that the average operative time was 94.2 minutes in the group of external fixation and 110.6 minutes in the group where they used MIPO [10].

References

[1] Fisher JS, Kazam JJ, Fufa D, Bartolotta RJ V. Radiologic evaluation of fracture healing. Skeletal Radiol 2019; 48: 349-361.

[2] Reyes Rebolledo V. Management of tibial pilon fractures in the Orthopedics and Traumatology Service of the Dr. Alejandro Dávila Bolaños Military School Hospital during the period from January 2018 to December 2019 2021; https://repositoriosiidca.csuca.org/Record/RepoUNANM16473.

[3] Burgos Pineda CS. The effectiveness of the MIPPO technique in functional restoration and aesthetic effect vs. The open reduction technique with plate and screws in humeral shaft fracture 2022;

https://repositorio.upao.edu.pe/handle/20.500.12759/9242.

[4] Martínez Pérez MK, Milanés Gómez JM, Pérez Pérez RÁ, Machado Linares Y, Rodríguez Oliva LM. Surgical treatment of tibial diaphyseal fractures with intramedullary nails 2017-2020. Revdosdic 2024; 4: e179.

[5] Yañez Arauz JM, Arzac Ulla I, Del Vecchio J, Eksarho A, Civetta L, et al. Mini-invasive osteosynthesis with locked plates in distal metaphyseal fractures of the tibia. Comparison of results between AO 43A and AO 43C fractures. Rev Asoc Argent Ortop Traumatol 2015; 80: 185-195.

[6] Celza Mena A, Delgado Quiñones A, Pancorbo Sandoval EA, Hernández Valera D, Díaz Prieto G, et al. Minimally invasive plating in fractures of the lower limb. Cuban Magazine Cuban Magazine of Orthopedics and Traumatology 2024; 38: e82.

[7] Guzmán-Guevara J, López-Cázares G, Barragán-Hervella RG, Villegas-Rosas JS, Alvarado-Ortega I, et al. Evaluation of patients with humerus diaphyseal fractures treated with DCP plate versus UHN central spinal nail. Rev Med Inst Mex Seguro Soc 2016; 54: S270-S274.

[8] Jabshetty A, Hussain Kazmi SS. Functional outcome following fixation of distal tibial fracture (Extra articular) with locking compression plate (LCP) using the minimally invasive percutaneous osteosynthesis (MIPO) technique. International Journal of Orthopedic Sciences 2020; 6: 687-691.

[9] Sharma N, Gulati A. Functional outcome of distal tibia fracture fixation with locking compression plate (LCP) using MIPO technique in a tertiary care hospital in eastern India. International Journal of Orthopedic Sciences 2022; 8: 310-313.

[10] Verma R, Sharma S, Beri A, Digra NA. Comparative analysis of hybrid external fixation versus MIPO in the management of proximal tibial fracture. International Journal of Life Sciences, Biotechnology and Pharma Research 2023; 12:1478-1480.