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Results of a fast-track knee arthroplasty according to the experience of a multidisciplinary team

Oriol Pujol*, Borja García, Teresa Faura, Montse Nuevo, Francisco Maculé

Hospital Clínic de Barcelona, Spain

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ABSTRACT

Introduction: Fast-Track is a multidisciplinary system that has changed the perception of total knee arthroplasty surgery. It's based on the education of the patient, an increased autonomy, adequate pain control and early mobilization. In the bibliography, there are no articles that refer to the evolution of the protocol once established, and most of them are comparatives with the previously existing conventional system. For this reason, the objective of our work is to study the evolution of the clinical results obtained through a Fast-Track system according to the experience acquired by the multidisciplinary team in this protocol.

Material and methods: It's a prospective observational study. We have analyzed the results obtained in our center from its implementation in 2013 (n = 65) to the end of the study in 2016 (n = 60). We evaluated the pain at 24 and 48 h after surgery, the time until the first ambulation, the range of flexion and extension at discharge, and length of hospital stay.

Results: The results obtained at the beginning of the implantation of the Fast-Track protocol in our center and the present ones do not present statistically significant differences. Mean pain at 24 h was 1,65/10 in 2013 and 1,5/10 in 2016, and at 48 h 1,61/10 and 1,58/10 respectively. Most of the patients in both years scored a pain below 4/10 at 24 h and 48 h. Mean time of the first ambulation was 260 min in 2013 and 254 min in 2016 (most of the patients started walking in ≤5 h). Mean flexion at discharge was 90,3° in 2013 and 87,92° in 2016 (most of the patients presented a flexion between 80 and 100°). Mean extension at discharge was 6,95° in 2013 and 8,1° in 2016 (most of the patients presented an extension between 0 and 10°). Mean length of stay was 2,46 days in 2013 and 2,43 days in 2016 (most of the patients had a stay of fewer than 4 days).

Conclusions: When applying the Fast-Track protocol by a multidisciplinary team in primary knee prosthetic surgery, the clinical results obtained are independent of the experience of this team in the protocol. So, from our experience, we can affirm that the protocol has enough solidity since its beginning and it maintains similar results despite the years of execution.

1. Introduction

The implementation of the Fast-Track protocols in our environment has meant a drastic change in the perception of total knee replacement surgery (TKRS). These multidisciplinary systems have allowed the optimization of the recovery by significantly reducing the postoperative pain, time to first ambulation, and complications. Secondarily, all this has made it possible to shorten hospital stay, as well as reduce economic costs.[1] In addition, it does not decrease the satisfaction[2] of our patients nor increases the risk of readmission or death.[3] (see Tables 1 and 2, Figs. 1 and 2)

Multiple Fast-Track systems have been described, all sharing a series of common basic premises, such as preoperative education, an adequate pain control, and early mobilization.

There is not enough literature that studies the relationship between the experience of the multidisciplinary team in these protocols and clinical results. For this reason, the objective of our work is to study the evolution of the clinical results obtained through a Fast-Track system according to the experience acquired by the multidisciplinary team in this protocol. We have analyzed the results obtained in our center from its implementation in 2013 to the present day (2016).

* Corresponding author.
E-mail addresses: opujol@vhebron.net (O. Pujol), borjagarciatorres@gmail.com (B. García), tfaura@clinic.cat (T. Faura), MNUEVO@clinic.cat (M. Nuevo), fmacule@clinic.cat (F. Maculé).

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Table 1
Patient characteristics in the different groups (2013 and 2016).

Year	2013	2016
Number of patients	65	60
Age (average)	72,26 years-old	71,47 years-old
BMI (average)	30,46 kg/m^2	30,56 kg/m^2
Gender	77% ♀	78% ♀
	23% ♂	22% ♂
Laterality	60% Right	53% Right
	40% Left	47% Left

Table 2
Summary of the outcome obtained through the Fast-Track system in 2013 and 2016. All the parameters studied are compared using different indicators.

Parameter	Indicator	2013	2016	p-value
Length of stay (days)	Average	2,46	2,43	0,883
	Median	2	2	0,584
	Patients with < 4 days stay	87,7%	90%	0,781
Flexion at discharge	Average	90,3°	87,92°	0,11
	Median	90°	90°	0,34
	Patients with 80–100° of flexion	86,2%	91,7%	0,402
Extension at discharge	Average	6,95°	8,1°	0,1
	Median	5°	10°	0,16
	Patients with 0-10° of extension	89,1%	89,7%	1
VAS 24 h	Average	1,65	1,5	0,52
	Patients with VAS 24 h < 4	95,2%	96,7%	1
VAS 48 h	Average	1,61	1,58	0,89
	Patients with VAS 48 h < 4	95,1%	98,3%	0,619
Time to first ambulation (minutes)	Average	260	254	0,78
	Median	225	255	0,155
	Patients with time ≤5 h	85,7%	86,4%	1

2. Material and methods

2.1. Patients and design of the study

Since the establishment of the Fast-Track program, a database of all patients undergoing TKRS in our center under this protocol was created. Given that this was a prospective observational study with a retrospective analysis, all data was revised in order to obtain two samples: 65 patients operated in 2013 (same year of the implementation of the program), and 60 patients operated in 2016. A cluster sampling was carried out, being the clusters the different months of the year. Following this method, we selected patients operated during three different months in 2013 and the same months in 2016.

The two study groups were similar in age, BMI, gender, and laterality.

2.2. Studied parameters

We evaluated the pain at 24 and 48 h after surgery according to the visual analog scale (VAS), the time until the first ambulation (from the exit of the operating room), the range of flexion and extension at discharge, and length of hospital stay.

Given that this was a multidisciplinary team, the studied values of the pain and the time until the first ambulation were registered by the plant nurses, while the mobility parameters such as the flexion and extension were collected by physiotherapy staff.

2.3. Fast-Track program in our center

In 2013, a multidisciplinary team composed of anesthetists, nurses, nursing assistants, physiotherapists and expert knee surgeons of our center was established. A series of changes were made before, during and after surgery in order to introduce the new protocol.

Patients are received a few days before the surgery by a nurse and a physiotherapist. During that preoperative education, patients are taught about the surgery, pain control, antithrombotic prophylaxis, possible complications, and exercises that have to be performed during the admission and at discharge. The basic concept of the program is to give the patient the maximum of autonomy, an effective pain control, and the achievement of an early mobilization (few hours after the surgery). During this preoperative education, individualized risk factors on each patient are also detected.

All patients underwent surgery by the same surgical procedure, under spinal anesthesia, performing a medial parapatellar arthrotomy, the use of an ischemia cuff, and local anesthetic infiltration (LIA). We did not use drainage or bladder catheterization of our patients on a routine basis.

A standardized analgesia protocol was used in the post-operative period, consisting of Paracetamol 1gr every 8 h, alternating with Dexketoprofen 25 mg every 8 h. Tramadol was used as rescue medication in cases of poor pain control. Gabapentin was used during two days in decreasing doses (600/300–300/300).

Mobilization begins a few hours after surgery, after the disappearance of the effects of spinal anesthesia. The patient starts ambulation with crutches, and also realizes flexion-extension exercises. The next day, a control blood test and control radiographs are performed. When the patient has a controlled pain and enough mobility to guarantee his autonomy, he is discharged.

2.4. Statistical study

In order to perform the statistical study, the quantitative variables were analyzed using the SPSS statistical program. All these behave as discrete variables, except the time of the first ambulation that behaves as a continuous one. Variables were individually analyzed, and values obtained from the different study groups were studied. After the study of the data, we did a graphical analysis (a bar chart for discrete quantitative variables, and a box-and-whisker chart for the continuous quantitative one), and a numerical analysis (comparison of means using Student T-Test, median comparison, and Fisher's exact statistical test).

3. Results

3.1. Pain

In 2013, 95,2% of the patients scored a VAS 24 h below 4, and, in 2016, they were 96,7% (p = 1). The mean was 1,65 in 2013, and 1,5 in 2016 (p = 0,52).

In 2013, 95.1% of the patients scored a VAS 48 h below 4, and in 2016 they were 98,3% (p = 0.619). The mean was 1.61 in 2013, and 1.58 in 2016 (p = 0.89). No statistically significant differences were found.

3.2. Time to the first ambulation

The mean time was 260 min in 2013, and 254 min in 2016 (p = 0,78). The median was 225 min in 2013, and 255 min in 2016 (p = 0.155).

In 2013, 85,7% of the patients started walking in a period of time less than or equal to 300 min (5 h), and, in 2016, they were 86,4% (p = 1). No statistically significant differences were found.

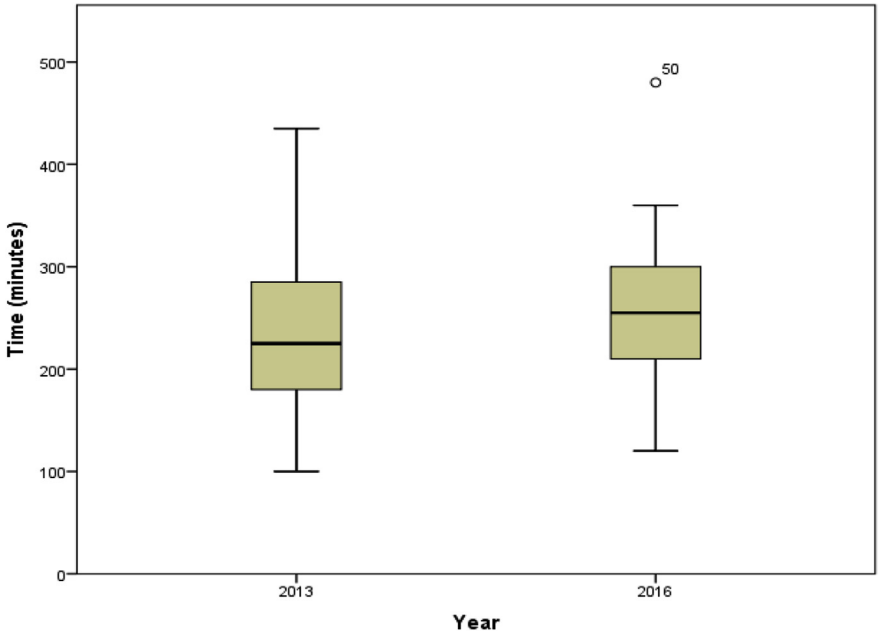

Fig. 1. Box-and-whisker chart that shows the time to the first ambulation in 2013 (left) and 2016 (right).

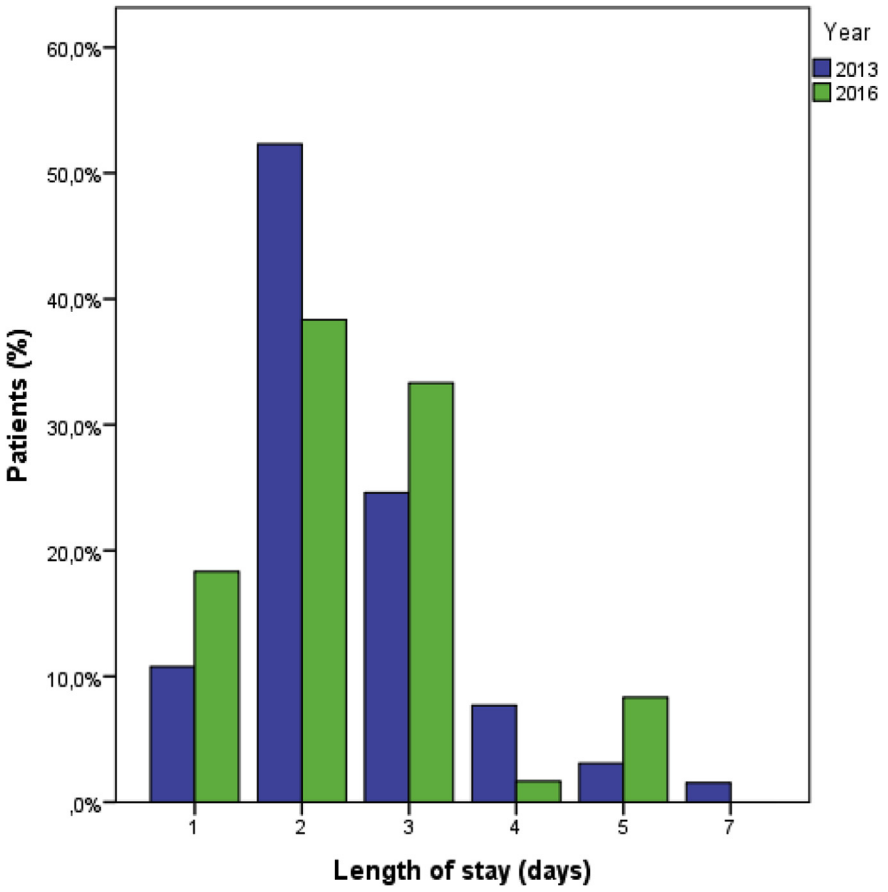

Fig. 2. Bar chart that shows the length of stay for the patients studied in 2013 and 2016.

3.3. Flexion and extension at discharge

The mean flexion was 90,3° in 2013, and 87,92° in 2016 (p = 0,11), and the mean extension was 6,95° and 8,1° respectively (p = 0,1). The median flexion was 90° in both groups (p = 0,34), and the median extension was 5° in 2013 and 10° in 2016 (p = 0.16).

In 2013, 91,7% of the patients presented a flexion between 80 and 100 at discharge, and 89,1% presented an extension between 0 and 10°. In 2016, 91,7% of the patients achieved the same results in flexion (p = 0,402), and 89,7% in extension (p = 1). No statistically significant differences were found.

3.4. The length of hospital stay

The mean stay was 2.46 days in 2013, and 2.43 days in 2016 (p = 0.883). The median was 2 days in both groups (p = 0.584).

In 2013, 87.7% of the patients had a stay of fewer than 4 days, and in 2016 they were 90% (p = 0,781). No statistically significant differences were found between the hospital stay of both groups.

4. Discussion

In most studies published in reference to Fast-Track, some aspects of this program have been individually valued, such as cost-benefit,[4] bleeding,[5] days of admission,[6] or complications. The purpose of our work is to study the evolution of the clinical results obtained through a Fast-Track system according to the experience acquired by the multidisciplinary team in this protocol. In the bibliography, there are no articles that refer to the evolution of the protocol once established, and most of them are comparatives with the previously existing conventional system.[4]

The two groups selected for the study showed homogeneity in terms of age, BMI, gender, and laterality, which made them comparable to each other. The analysis of the different parameters between the group in which the Fast-Track protocol was implemented (2013) and the group from 2016, did not show statistically significant differences, thus supporting the theory that the protocol is strong enough to be independent from the experience acquired by the multidisciplinary team in that protocol.

Postoperative pain was measured at 24 h and at 48 h by VAS. All patients underwent local infiltration of anesthesia (LIA). In the group of 2013, 95,2% of the patients scored a VAS-24 h below 4, and in 2016, they were 96,7% (p = 1). After 48 h, 95,1% in 2013, and 98,3% in 2016 (p = 0,619). Holm B. et al[7] found that out of a total of 100 patients analyzed, 90% scored a VAS below 5 in the first 24 h and below 4 after 48 h. Our results showed that the means were maintained with a VAS below 2 in both groups. Barastegui et al[8] scored a mean VAS of 1.47 after 36 h of being operated, thus finding differences regarding the group that was not subjected to LIA.

Early mobilization of patients reduces the risk of thrombosis and contributes to fast recovery according to Husted et al.[13] In our patients, more than 85% started walking within the first 5 h after surgery, in both groups. They presented a mean time of 260 and 254 min in each group, without showing statistically significant differences. The team of Winther SB. et al[9] performed a review of a total of 369 patients undergoing total knee prosthesis, obtaining a mean time of the beginning of ambulation of 3.5 h, with 95% of patients being within this time interval.

The mobility results at discharge were invariable despite the years, with a mean of flexion of 90,3° in 2013, and 87,3° in 2016, and 8,95° and 8,1° of extension. No statistically significant differences were found. The obtained degrees were similar to the group of Carvalho Junior et al.[10] and Motififard M. et al.,[11] regardless of whether the wound closure was performed in flexion or extension.

The mean hospital stay in 2013 and 2016 was 2.46 and 2.43 days respectively, a non-statistically significant difference. The large series of patients operated through Fast Track, such as Kehlet E. et al.[2] and Husted H. et al.,[12] with a total of 210 and 109 patients, obtained a mean hospital stay of 2.4–2.7 days, similar to ours. Most of the studies show a similar interval between 2 and 3 days,[13] while there are some groups, like the one of llfeld B. et al.[14] and Thienpot E. et al.,[15] that propose knee prosthetic surgery with only 1 day of admission in selected patients depending on their age, BMI, comorbidities, etc.

Our protocol has been applied without variations throughout the years that comprise this study, allowing us to analyze the influence of the experience of the multidisciplinary team on the clinical results obtained. There were no significant differences in pain after 24 h and 48 h, the time of the first ambulation, the flexion and extension at discharge, or the length of stay between the implantation of the protocol in 2013 and now. Although it is a complex, multifactorial and multidisciplinary protocol, the obtained results show that it is sufficiently solid to keep its results regardless of the experience of the team during the protocol. Therefore, results obtained from the moment of the implementation are equivalent to those published by other centers, and also, they persist over time.

5. Limitations

The main limitation of this study is the lack of indicators that allows us to analyze the evolution of our patients in the long term. This is because the second sample has been recently operated (2016), and the follow-up will be studied in the coming years.

On the other hand, this is a prospective observational study.

6. Conclusion

The results obtained at the beginning of the implantation of the Fast-Track protocol in our center and the present ones do not present significant differences in pain after 24 h and 48 h, the time of the first ambulation, flexion-extension at discharge, nor the length of hospital stay.

The results obtained in our center are similar to the results shown by other studies.

When applying the Fast-Track protocol by a multidisciplinary team in primary knee prosthetic surgery, the clinical results obtained are independent of the experience of this team in the protocol.

So, from our experience, we can affirm that the protocol has enough solidity since its beginning and it maintains similar results despite the years of execution.

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Conflicts of interest

All authors declare no conflict of interest.

Ethical statement

All authors declare that the ethical norms have been followed during this study.

Declarations of interest

None.

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