

Clinical outcome before and after COVID-19 quarantine in patients affect of knee and hip osteoarthritis.

Experience of orthopedic department in one of the first European country involved in COVID-19 pandemic.

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Summary. *Background:* The emergency caused by COVID-19 Pandemic resulted in a complete suspension and consequent delay of common planned surgery such as Total Hip replacement, Total Knee replacement and Partial Knee replacement. At the same time, the quarantine imposed changes to the normal lifestyle of these patients. The purpose of our study is to evaluate how the presence of these two factors affect the quality of live of patients living in the Italian red zone. *Methods:* From outpatient pre-operative assessment we collect data about: demographic data, WOMAC score, NRS (0-10), PCS SF12 and MCS SF12 score. Selected patients were therefore contacted by phone call and re-assess using the same score. In addition, patients were asked if they intended to undergo the planned surgery again despite the current emergency *Results:* 34 patient have been recruited for the study. Male/female ration was 16/18, mean age was 65 years. Pre operative outpatient assessment mean WOMAC score was 40.87 (SD ± 8.73), mean NRS was 8.29 (SD ± 1.03), PCS SF12 was 28.99 (SD ± 4.64) and MCS SF12 was 41.17 (SD ± 4.32). At re-evaluation the mean WOMAC score was 34.62 (SD ± 15.26), mean NRS was 5.32 (SD ± 2.85), PCS SF12 was 40.25 (SD ± 3.19) and MCS SF12 was 50.73 (SD ± 5.48). **Conclusion:** The never seen pandemic from Covid-19 has deeply changed our lifestyle, impacting normal daily activities but also on regular surgical activity in patients affected by osteoarthritis. Our study suggest the mandatory quarantine have a limited impact, or even beneficial effect, on clinical score of patient in list for joint replacement. (www.actabiomedica.it)

Keywords: Hip arthroplasty; knee arthroplasty; total knee replacement; partial knee replacement; clinical outcome; COVID-19; hip replacement; pre-operative planning.

Background

COVID-19 pandemic represented a huge challenge for the Italian nationals healthcare system [1].

Especially in Lombardy (Northern Italy) where have been reported 80.089 cases among 215.858 cases registered in Italy on May, 6th 2020[2]. To deal with this heavy burden, health authorities had to redistribute the resources of nursing staff, medical staff and hospital facilities to account this exceptional emergency [3, 4]. In this scenario, National authorities released

a dedicated decree to reduce the spread of the virus from March, 9th 2020 to create a so called "National red zone" [5]. This measure has greatly changed the lifestyle of citizens but its result efficacy in limiting the spread of the virus [6]. This Decree, for reasons of public health, severely limited citizen's lifestyle, limiting their chances to move and live public places, in order to control the spread of the virus [7]. Because of the emergency, many departments, included our Orthopedics and Traumatology department, had to reduce their services to provide medical resources and

competences to face the rise of virus. In this context, it was necessary to suspend the elective surgical activities including joint replacement surgery especially of knee and hip.

Total or partial joint arthroplasty (TOPJA) of hip and knee is undertaken to relieve pain and improve function in individuals with advanced osteoarthritis of the joint, representing one of the most performed orthopedic elective surgery in Italy and in the world with number in growing [8, 9, 10]. According to literature this surgery is reserved for patients suffering from severe degrees of arthrosis with history of conservative treatment failure with associated reduction in quality of life [11]. This solution allows an improvement in patient's lifestyle with reported favorable outcomes [12].

The purpose of our study is to evaluate how the suspension of elective surgical activities and the mandatory quarantine influenced the daily activities in patient in surgery list for total hip replacement (THR), total knee replacement (TKR) and partial knee replacement (PKR) delayed for COVID-19 pandemic.

Methods

From the database of patients on surgery waiting list for THR, TKR and PKR of our hospital we selected patients who had made an outpatient pre-operative assessment for joint replacement surgery before quarantine issue and then planned surgery postponed due COVID-19 emergency. In our department, pre-operative assessment are usually carried out from 1 to 2 months before the planned surgery. Our unit set-up consists of an orthopedic and a multidisciplinary anaesthesiologist-led assessment as recommended in literature [13]. In the orthopedic examination we collect pathological history, physiological history with assessment of quality of life, social history, imaging necessary for surgical planning, clinical examination, identification of potentially modifiable risk factor and consequent patient information and education for surgery [14]. We use generic instrument for the assessment of quality of life. The Short Form 12 (SF-12) scale is a validated questionnaire assessing health-related quality of life, developed in the USA from the

original SF-36 [15]. It measure different dimensions such as physical function, role limitations due to physical health problems, pain, general health, vitality (fatigue/energy), social function, role limitations due to emotional problems and mental health. The physical dimensions can be summarized into the physical component summary (PCS), while the mental component summary (MCS) is obtained from other dimensions. It is a self-administrated 12-item questionnaire, scoring ranges from 0 to 100 points, where higher scores representing better health.

Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is score greatly used in literature to assess pain, function, and stiffness of the lower limb [16]. The WOMAC includes 24 items covering 3 domains: pain, stiffness, and physical function, and captures the level of each domain with 5 response categories using an ordinal scale. Lower values in the traditional scoring method (ranging from 0 to 96) reflect a better health status. We also use the Numeric Rating Scale from 0 to 10 to assess pre operative pain perception [17].

We select 34 patients eligible for study, 14 in list for THR, 12 for TKR and 8 for PKR. Inclusion criteria were: complete pre-operative assessment with admission for surgery during pre-quarantine time, absence of any COVID-19 infection related symptoms or exams during the observed period, absence of any significant clinical variation during observed period, planned surgery delayed for quarantine issue in COVID-19 emergency and complete adherence to authority disposition for quarantine.

From outpatient pre-operative assessment we collect data about: demographic data, WOMAC score, NRS (Numeric rating scale from 0 to 10), PCS SF-12 and MCS SF12 score [15 - 17]. Selected patients were therefore contacted by phone call and with a email self-administered questionnaire in order to reset the risk of contagion by coming to outpatient visits. They were evaluated using WOMAC score, NRS, PCS SF12 and MCS SF12 score. In addition, patients were asked if they intended to undergo the planned surgery again despite the current emergency. The phone reevaluation was carried out on May 7th, 2020, after the release of the new Ministerial Decree of 4th May 2020 which reduced the restrictions. 55 days have passed since the

establishment of the “Nation Red Zone” decree on march, 5th 2020.

Results

We select 34 patients eligible for the study, all data have been anonymized and telematic informed consent for the study were collected for every participants. There were 16 male patients and 18 female, mean age was 64.54 ± 7.19 standard deviation (SD) (**Table 1**). All patient indication joint replacement is primary osteoarthritis, in case of partial knee replacement is medial unicompartimental primary osteoarthritis without involvement of others compartments. All PKR involving medial compartment of knee. At pre operative outpatient assessment the mean WOMAC score was 40.87 (SD ± 8.73), mean NRS was 8.29 (SD ± 1.03), PCS SF12 was 28.99 (SD ± 4.64) and MCS SF12 was 41.17 (SD ± 4.32). At control the mean WOMAC score was 34.62 (SD ± 15.26), mean NRS was 5.32 (SD ± 2.85), PCS SF12 was 40.25 (SD ± 3.19) and MCS SF12 was 51.73 (SD ± 5.48) (**Table 2**).

In Table 3 we classified the result according type of arthroplasty: total hip replacement, total knee replacement and partial knee replacement.

The two group of data are compared using T-student test and all P-value are < 0.05 except for WOMAC score in partial knee replacement with P-value of 0.37.

When asked, 7 patients would prefer to postpone the surgery for fear of the pandemia, while the other 34 patients will accept the proposed surgery despite the persistence of COVID-19 pandemic. All patient referred complete adhesion to quarantine disposition.

Conclusion

The COVID-19 crisis has profoundly changed peoples lifestyle and hospital activities in the most affected localities [1-6]. The normal activity of the orthopedics departments linked to elective surgery, especially total or partial joint arthroplasty surgery, has been suspended. This situation led to a delay in the treatment of patients affected by osteoarthritis. Patients who have indication for total TOPJA have normally a low quality of life due to osteoarthritis limitation in joint function [18].

Our study report data comparable with data present in literature on preoperative WOMAC score [19]. Even on NRS and SF-12 mean score are comparable to other study presents in literature [20, 21, 22]. This confirm that our data represent a normal finding in population that is going to undergone in hip and knee arthroplasty surgery [20, 23]. Obviously, our data are hardly comparable with data collected normal situation but we observe an improvement of the score used to evaluate this patients during post quarantine follow-up (**Table 2**). Paradoxically, it seems that quarantine had a beneficial effect on hip osteoarthritis pain and joint function even comparable or better to arthroplasty or pharmacological and physical therapies in a short observation [24 - 26]. However we note that only 7 patients would postponed surgery. This seems to suggest that patients still feel the need to undergo surgery.

Our hypothesis is that the restriction of normal daily activities could lead to a reduction in the self perception of their clinical condition related to hip and knee osteoarthritis [27]. Pain perception in osteoarthritis is a sum of complex pathways influenced by local factors and central pain-processing [28, 29]. The

Table 1. Demographic and clinical data

Sex	Number (n)	Percentile (%)
Male	16	47
Female	18	53
Age		
Mean (yy)	Range	Standard deviation
64.54	55 - 80	7.19

Table 2. Clinical outcome of all patients in list for Total or partial joint replacement of knee and hip

	Pre COVID QUARANTINE (mean \pm standard deviation)	Post COVID-19 QUARANTINE (mean \pm standard deviation)	P-VALUE
WOMAC Score	40.87 \pm 8.73	34.62 \pm 15.26	0.02
NRS	8.29 \pm 1.03	5.32 \pm 2.85	<< 0.05
PCS SF12	28.99 \pm 4.64	40.25 \pm 3.19	<< 0.05
MCS SF12	41.17 \pm 4.32	51.73 \pm 5.48	<< 0.05

Table 3. Result classified according surgery type

	Pre COVID QUARANTINE (mean \pm standard deviation)	Post COVID-19 QUARANTINE (mean \pm standard deviation)	P-VALUE
Total Hip Replacement			
WOMAC Score	44.86 \pm 8.52	32.86 \pm 17.88	0.04
NRS	8.07 \pm 1.33	5.79 \pm 3.66	0.02
PCS SF12	30.33 \pm 5.0	39.9 \pm 3.70	<0.05
MCS SF12	40.95 \pm 3.51	50.14 \pm 6.86	<0.05
Total Knee Replacement			
WOMAC Score	38.18 \pm 7.86	34.59 \pm 13.55	0.15
NRS	8.42 \pm 0.79	5.08 \pm 0.79	<0.05
PCS SF12	28.31 \pm 4.42	40.36 \pm 2.89	<0.05
MCS SF12	41.42 \pm 4.32	52.67 \pm 4.30	<0.05
Partial Knee Replacement			
WOMAC Score	39.20 \pm 9.34	37.75 \pm 14.08	0.37
NRS	8.50 \pm 0.75	4.88 \pm 2.30	<0.05
PCS SF12	27,65 \pm 4.22	40.66 \pm 3.08	<0.05
MCS SF12	41.18 \pm 4.32	53.11 \pm 4.08	<0.05

exceptionality of the situation could even have an influence on mental balance of patients and several studies have analyzed the correlation of mental status and osteoarthritis pain perception [30, 31]. Different studies, all from China, examined the frequency of specific mental health-related variables in persons affected by the COVID-19 outbreak, emphasizing an increase in anxiety, depression, self-reported stress and disturbed sleep [32, 33]. Quarantine has been associated also in Italy with high stress level, irritability, insomnia, depression and acute stress is associated to a decrease of proinflammatory cytokines [34, 35]. In addition the quarantine required people to stay at home with a reduction of outside exercise and physical activity, saving

from joint overload, which may have given a clinical benefit [35].

Our study have limitations: small sample size due need to have patient with complete pre-operative assessment with clinical scores, lack of previous research studies on the topic due the exceptionality of COVID-19 global pandemic emergency situation. However, we underline the importance of performing this type of observational study to better know the effect of social limitations and medical resource redistribution have on patient affect by osteoarthritis.

In conclusion, despite clearly limitation, our study suggest that suspension of elective surgery and the mandatory quarantine have a limited impact, or

even beneficial effect, on clinical score and pain perception of patient in list for joint replacement. Further multi-centric and multi-country research with greater sample are needs to investigate these findings also to better organize elective surgery after restrictive measures.

Conflict of interest

The authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article

Statement

This statement is to certify that all Authors have seen and approved the manuscript being submitted. We warrant that the article is the Authors' original work. We warrant that the article has not received prior publication and is not under consideration for publication elsewhere. On behalf of all Co-Authors, the corresponding Author shall bear full responsibility for the submission.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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