ORIGINAL ARTICLE

Total Knee Arthroplasty in Patients with Parkinson's Disease: A Critical Analysis of Available Evidence

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ABSTRACT

Aim: To determine the significance of total knee arthroplasty in patients with Parkinson's disease.
Study design: Retrospective study.
Place and duration of study: Department of Orthopaedics, Sahara Medical College, Narowal and CMH Kharian Medical College Kharian from 1st July 2020 to 30th September 2022.
Methodology: Fifty patients suffered from Parkinson disease which was already diagnosed and the patients attended the Orthopaedic Ward for knee arthroplasty were included. Patients were then followed up till 12 weeks for the clinical analysis of the preoperative and postoperative outcomes of the procedure. Western-Ontario and McMaster-Universities Osteoarthritis Index, Short Form Health Survey-scale, physical component-summary as well as mental-component summary were used for the critical analysis of the patients underwent knee arthroplasty. Knee Society-Score and Knee Society-Function Score determined the deformity, stability, pain and functional analysis.
Results: The mean age of the cases was 66.91 ± 6.62 years. There were more females than males in this study with a comparative percentage of 20% vs 80% respectively. There were 60% left knee arthroplasty with 22% in grade IV. Range of motion as well as stability of the patients was also improved. SF-12 also showed a significant improvement in the Physical component-summary and mental-component summary levels. There was a reduction in pain and stiffness analyzed through Western-Ontario and McMaster-Universities Osteoarthritis Index scoring and more flexion as analyzed by range of motion.
Conclusion: There is better scoring of patients from pre to postoperative state although still towards lower side and with poor motor functional outcomes.
Key words: Ganglion, Neurodegenerative, Arthroplasty, Significance, Analysis

INTRODUCTION

Parkinson' disease (PD) is a brain disorder that can affect specifically people of certain age group. It is characterized as a neurodegenerative disorder and its frequency is 4 million all around the globe. This disease occurred usually due to dopaminergic activity that chiefly disturbs the function of basal ganglion which results into cognitive impairment and motor disturbances.[1] Peoples of 55 years or older are among the sufferers or during which symptoms of the disease appears[2]. With surge in Parkinson' disease patient's from last decade, numerous therapeutic interventions has been made to augment the life expectancy of PD patients[3-5].

Within recent time, total knee arthroplasty is introduced to lessen the pain. Therefore, its application is significantly increased from last years. It is of vital importance that orthopedic surgeons have wider knowledge and clarity in the present approach of total knee arthroplasty especially in consideration with PD patients. Literature already suggested that, application of total knee arthroplasty has been tremendously increased from 1980s due to its wider range of application and its beneficial results. Success chances in surgery are also strongly linked with the age and underlying health of the patient[6-9]. This technique show similar results in both genders. In total knee arthroplasty patients who had PD, mortality rate observed to be higher in males. On the other hand, females are usually associated with longer hospital stay after surgery. Patient' overall well-being in spite of PD is playing crucial role. Patients who had comorbidities like cardiovascular disorders, dementia has increased chances of mortality and morbidity[10-12]. Present study was designed for the estimation of success rate and outcomes of total knee arthroplasty in Parkinson' disease patients.

MATERIALS AND METHODS

This retrospective study performed at Department of Orthopaedics, Sahara Medical College, Narowal and CMH Kharian Medical

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College Kharian from 1st July 2020 to 30th September 2022 and a total 50 consecutive patients age of 55-78 years were enrolled. The patients sample size was generated through Australian Bureau of Statistics sample size calculator applying 95% confidence of interval. The patients suffered from Parkinson disease which was already diagnosed and the patients attended the orthopedic ward for knee arthroplasty were included in the study. Patients were having autoimmune comorbidities were excluded from the study. The study was ethically approved from the institutional board. Before the enrolment of the patients the consent of each patient was taken through their attendants. A written informed consent was used for the purpose. Patients were clinically defined as fit for surgery before the initiation of the operative protocol. Knee arthroplasty was conducted in each patient. Patients were then followed up till 12 weeks for the clinical analysis of the preoperative and postoperative outcomes of the procedure. Western-Ontario and McMaster-Universities Osteoarthritis Index (WOMAC) (pain, stiffness, and function), Short Form Health Survey-scale (SF-12), Physical component-summary (PCS) as well as mental-component summary (MCS) were used for the critical analysis of the patients underwent knee arthroplasty. Knee Society-Score (KSS) and Knee Society-Function Score (KSFS) determined the deformity, stability, pain and functional analysis. Preoperative and post-operative range of motion (ROM) as well as severity of Parkinson's disease was evaluated through Hoehn and Yahr scale. Data was statistically analyzed by using SPSS version 26.0.

RESULTS

The mean age of the cases was 66.91±6.62 years. There were more females than males in this study with a comparative percentage of 20% vs 80% respectively. The mean body mass index levels of all the Parkinson's patient undergoing knee arthroplasty was 23.84 ± 3.26. There were 60% left knee arthroplasty with 22% in grade IV (Table 1).

The clinical outcomes of the total knee arthroplasty presented an improvement in KSS score for pain in postoperative cases. ROM as well as stability of the patients was also improved.

SF-12 also showed a significant improvement in the PCS and MCS levels. There was a reduction in pain and stiffness analyzed through WOMAC scoring and more flexion as analyzed by ROM (Table 2).

The follow-up of such cases presented data where bruises was the most common complication noticed followed by gastrointestinal disorders as well as lower limb swellings. No cases of morbidity were observed in the follow up months (Fig. 1). The survival rate was observed as 87.05% with a 95% confidence interval being between 64.6% to 99.995 in total knee arthroplasty cases (Fig. 2).

Table 1: Baseline features, Hoehn and Yahr staging (n=50)

Variables	TKA Group
Gender	
Male	10 (20%)
Female	40 (80%)
Weight (kg)	59.10 ± 9.95
Height (cm)	157.35 ± 7.50
Body mass index (kg/m^2)	23.84 ± 3.26
Age	66.91±6.62
Side	
Left	30 (60%)
Right	20 (40%)
Grade	
I	6 (12%)
II	19 (38%)
III	14 (28%)
IV	11 (22%)
V	-

Table 2: Critical analysis through various indexing methods (n=50)

Variable	Total Knee Arthroplasty		P value
	Preoperative	Postoperative	
KSS			
Pain	21.12±9.61	43.62±12.11	< 0.01
ROM	22.23±1.88	23.62±1.62	< 0.01
Stability	17.90±2.01	24.12±1.19	< 0.01
Total	61.22±9.66	91.33±12.61	< 0.01
KSFS	39.75±6.53	58.13±31.13	0.02
SF-12			
PCS	15.62±3.57	20.24±5.11	< 0.01
MCS	20.31±3.52	24.11±5.24	0.02
WOMAC			
Pain	8.40±2.56	3.41±4.57	< 0.01
Stiffness	2.96±1.33	0.64±1.52	< 0.01
Function	38.03±6.75	26.46±15.35	< 0.01
ROM			
Flexion	111.10±9.34	118.35±8.24	< 0.01

SF-12 = Short Form-12 Health Survey scale, WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index, KSS = Knee Society Score, = ROM =range of motion

Fig. 1: Complication analysis in postoperative total knee arthroplasty
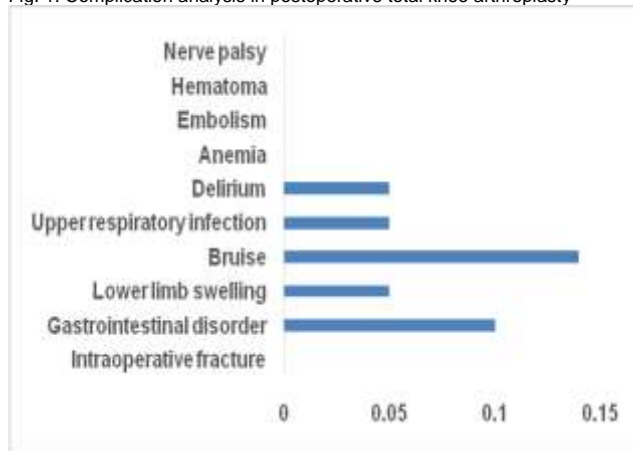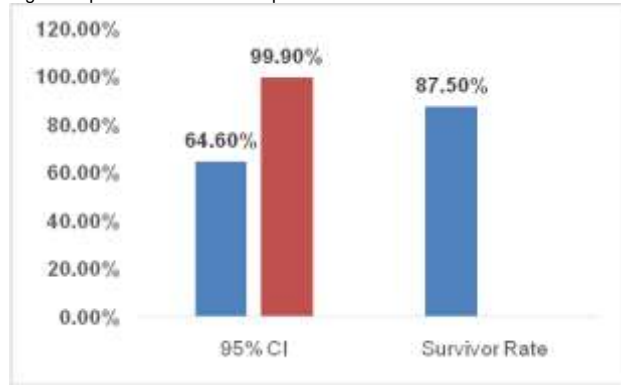

Fig. 2: Kaplan-Meier survivorship cure

DISCUSSION

Total knee arthroplasty is an important intervention that can be used to reduce the overall pain in weight bearing joints. Yet, studies have proved that, total knee arthroplasty in Parkinson; disease patient is a challenging subject because patient were already prone to high risk of fall, higher chances of osteoporosis, slow recovery/healing and bone fractures[13-15].

Present study demonstrated both clinical and functional outcomes in PD patients after and before total knee arthroplasty. Follow-up data of study participants showed that, severity of pain is usually associated in functional outcomes. Advances stages and higher aged patients showed poor function scores in contrast to early stage patients. SF-12 scale highlights mental health evaluation of the study participants. It is clear from the data that, this scale is again not showing good score due to motor symptoms. Other studies also represented the similar findings in which poor motor score symptoms was observed depending upon the progression and severity of PD among patients[16-19].

There was no patient with nerve palsy, embolism and DVT. The follow-up of such cases presented data where bruises was the most common complication noticed followed by gastrointestinal disorders as well as lower limb swellings. Studies also proved that, total knee arthroplasty patients showed higher chances of complications and longer hospital stays as compared to the controlled group[20-22].

CONCLUSION

There is better scoring of patients from pre to postoperative state, however theses scores are still not functionally very efficient for pain and motor functioning evaluation in Parkinson' disease patients.

Conflict of interest: Nil

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