Preoperative Evaluation of Overweight and Obese Iraqi Patients in Primary Total Knee Arthroplasty

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ABSTRACT

Background: Total knee arthroplasty is one of the common surgical procedures in orthopedic surgery.

Objectives: Study of obese and overweight Iraqi patients' body mass index linked to time of presentation for primary total knee arthroplasty in relation to their gender, age, chronic diseases, intraoperative prosthetic sizes and complications.

Methods: Cross sectional analytic study design done for 121 patients, 36 males and 85 females (mean age = 56.59 years), operated on for primary total knee arthroplasty, in Medical city complex/hospital of surgical specialties and Nursing home hospital. Special paper forma used to record all patient preoperative data, intraoperative prosthetic sizes and complications. The surgery done by the same team using the same implant design.

Results: The patient age found to decrease significantly ($P < 0.001$) by increase body mass index. Age of patients shown with the strongest negative correlation to increase body mass index in primary total knee replacement. Also increased female gender dominance in overweight, and stage I, II and III obesity and predilection with significant P value < 0.009 in primary total knee arthroplasty. The knee society score and functional score (mean ±SD) were shown to decrease with increasing body mass index with significant P value < 0.009.

Conclusions: Iraqi patients with higher body mass index required total knee arthroplasty at younger age group. Increased female gender dominant predilection with increasing body mass index. Obesity plays a little role to increase intra operative complications.

Keywords: Obesity, Overweight, Total knee replacement, Body mass index.

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Total knee arthroplasty (TKA) has become the ideal method for treating knee diseases like end-stage knee osteoarthritis and rheumatoid arthritis[1,2].

TKA is a very effective treatment and has been considered a surrogate measure. The rate of joint replacement is steadily increasing because in turn the demand for definitive therapies[2].

Overweight and obesity represent a hugely growing threat to the health of populations. Obese patients have the potential to pose several challenges for arthroplasty surgeons from the standpoint of the influence obesity has on osteoarthritic symptoms, their peri-operative medical management, the increased intraoperative technical demands on the surgeon, the intra- and post-operative complications and the long term outcomes of total knee arthroplasty[3].

Obese patients with severe osteoarthritis and rheumatoid knee joints, axis deviation, and ligamentous instability are a major challenge for the surgeon. These patients often lack the ability of postoperative partial weight bearing. There are no specific ideal method shows how to deal with the influence of obesity on the choice of the individual implant[4,5].

Methods

From October 2014 to October 2015, 121 patients (121 knees) were presented to us who were candidate for primary total knee arthroplasty 36 males and 85 females, patients age (56.8±11.87 years) and the BMI (32.9±6.35 kg/m^2) included Patients with grade 3 or 4 according to Kellgren and

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Lawrence system of radiological OA classification. Rheumatoid arthritis patients and patients who agreed to participate in this study. We excluded from the present study patients with BMI more than 45 kg/m^2, patients who in need of constrained knee arthroplasty, disorders of the feet, ankles, hips, or spine causing abnormal gait pattern, patients with bilateral TKR, severe visual impairment, neurological conditions affecting movement. All patients were subjected to routine history, physical examination, full laboratory investigations, radiology study including full lower limb length x-ray with knee measurement including intramedullary angle, lateral distal femoral angle, medial proximal tibial angle, tibiofemoral angle, anteroposterior standing view, lateral view, skyline view.

General anesthesia was used in 78 case and spinal anesthesia in 43 cases. Patients received prophylactic antibiotic preoperatively, which consisted of 400g intravenous targocid vial within 30 minutes prior to skin incision. A digital tourniquet was placed around the thigh, and inflated pressure is calculated automatically and inflated after elevation of the limb for two minutes before skin incision. The tourniquet used is A.T.S. ® (Automatic Tourniquet System).

The medial or lateral parapatellar approach is employed as the standard approach, the surgeon performed only mid vastus procedures during this study. All patients operated on by the same team and using extension gap technique. Each patient had implantation of the same cemented, cruciate substituting implants, modular condylar prosthesis. The prostheses used are LPS-Flex bearing Knee. Patients' intraoperative complications were recorded if happened.

Results

The patients were categorized into 4 groups according to their BMI, (Table 1).

Patients presented with chief complaint of pain mainly in obese group, while in overweight patient was pain and stiffness with significant P value < 0.001.

Pain killer use were regular in increasing BMI with insignificant P value <0.14. Patients with different obesity groups in relation to back pain and hip pain shown with insignificant P value.

At time when an arthroplasty treatment was needed, the patient age (mean ± SD) decreased considerably shows (significant *P* < 0.001) by increasing BMI in primary TKA.

In the higher stages of obesity, knee society score and functional score was at significantly lower levels at the time of knee arthroplasty compared to overweight patient shows (significant p value < 0.009).

Correlation between patient age (mean ± SD) at time of primary TKR over patient gender with insignificant (P value <0.42), clears that patient gender didn't modify the time of presentation for surgery, (Table 4).

Table 1: Distribution of patient's gender in overweight and stages of obesity.

		BMI (kg/m^2)				Total	P value
		Overweight	Obese Stage I	Obese Stage II	Obese Stage III		
Gender	Male	9	18	8	1	36	< 0.009
	Female	22	23	24	16	85	
Total		31	41	32	17	121	
Chi-squared test used							

Table 2: Distribution of patients' chief complaint and pain killer use, back and hip pain over different stages of obesity and overweight.

	BMI (kg/m^2)					
	Overweight	Obese Stage I	Obese Stage II	Obese Stage III	Total	P value
Chief Complaint:						
Pain	7	30	21	10	68	<0.001
Pain + stiffness	23	9	10	6	48	
Pain + deformity	1	2	1	1	5	
Pain killer:						
Regular	14	11	22	11	58	<0.14
On need	17	30	10	6	63	
No	0	0	0	0	0	
Back pain:						
Yes	20	32	26	11	89	<
No	11	9	6	6	32	0.273
Hip pain:						
Yes	1	3	3	0	7	<
No	30	38	29	17	114	0.461
Chi-squared test used						

Table 3: Distribution of patient age, KSS, functional score (mean ±SD) in overweight and obesity stages.

	BMI (kg/m^2)				P value
	Overweight	Obese Stage I	Obese Stage II	Obese Stage III	
Age at time of arthroplasty (years) mean ± SD	68.4 ± 8	53.3± 8.2	51.9±7.9	51 ± 4.1	< 0.001
Knee society score (100 Points) mean ± SD	20.5 ± 8.1	14.9± 6.3	14±8.1	13± 4.2	< 0.009
Functional score (100 Points) mean ± SD	23.2 ± 9.4	17.9± 8.2	16±6.4	15± 5.3	< 0.009
ANOVA (multivariate sample mean analysis)					

Table 4: Comparison between patient ages at presentation according to gender.

	Male	**Female**	**P value**
Age (mean ± SD) year	54.1 ± 12.2	57.6 ± 11.8	*< 0.42
Number	36	85	** 0.0002
* Student t- test **Chi-square test			

Table 5: Intraoperative complications encountered through overweight and different stages of obesity.

	BMI (kg/m^2)					
	Overweight	Stage I	Stage II	Stage III	Total	P value
Complications:						
- Popliteal vein injury	0	0	1	2	3	<
- Femoral condyle	0	1	0	2	3	0.030
- Fracture						
- No complications	31	40	31	13	115	
Chi-squared test used						

Discussion

These study patients divided into obesity groups by BMI according to WHO classification[3,4]. The result show's that increased female gender dominance predilection in overweight, stage I, II and III obesity with significant P value < 0.009. The relation between patient age (mean ±SD) (male 54.1±12.2 and female 57±11.8) at time of surgery to patient gender with insignificant (P value <0.42) clears that patient gender did not modify the time of indication of primary TKR. According to age, the indication of a primary total knee arthroplasty is highly affected by the BMI. patients with higher BMI need TKR at a younger age. The patient age at presentation was decreased by increasing BMI in which an arthroplasty treatment was done. The mean age in overweight patient (68.4± 8), stage I (53.3±8.2), stage II (51.9±7.9), stage III obese patient was (51 ± 4.1). This means that BMI and age are strongly related to time of primary TKR decision with significant (*P value* < 0.001).

The present results showed that the primary TKR was done at significantly lower knee society score (KSS) and functional score with increased BMI. The KSS and functional score (mean ±SD) in overweight patient (20.5 ± 8.1), (23.2±9.4), stage I (14.9±6.3), (17.9±8.2), stage II (14±8.1), (16±6.4), stage III (16 ±4.2), (15±5.3) respectively with significant p value < 0.009.

Daniel Guenther[6] highlighted that higher BMI leads to TKA decision in younger age, which is carried out mainly at decreased levels of pre-operative joint function score and knee society score. While Laddu DR[7] cleared that obese patients have an increased risk of formation of osteoarthritic joint changes. So those long suffering candidates often show complaints due to their decreased level of performance and pain.

It's shown that chief complaint of our patients predominantly pain and stiffness in overweight patients but the pain was more predominant in obese stage I, II, III patients with significant p value <0.001.

Our observation in this study that in overweight patient had nearly equal need for regular or on need pain killers use, while in obese stage II, III patients were predominantly regular use of pain killers with insignificant p value < 0.14.

Suleiman[8] performing TKA on patients with high BMI may increase mobility leading to improved quality of life.

Total knee arthroplasty across BMI categories by Allen SR[7] reported that it's a likelihood choice for the stage III obese adult patients.

Wendelboe AM[9] Showed that there was strong association between increasing BMI and total knee replacement procedures, also that obesity did not entail independent risk knee revision procedures.

In the present, study we noticed that the TKR procedures in our facility regarding intra operative complications rate was three vascular complications in stage II, III obesity and three femoral condyle fracture in stage I, III obesity with significant P value < 0.03.

Michalka PK[10] showed that obesity was considered an independent risk factor for adverse outcome after arthroplasty surgery and didn't translate increased risk of complications. While Daniel Guenther[6] cleared that per operative complication rate was not increased significantly by increasing BMI.

We noticed that TKA procedures has the advantage at all levels of BMI, but we exclude patients with BMI ≥ 45 kg/m^2, and we light up that those patients need more rehabilitation and surveillance because due to weak hamstring and quadriceps muscle function.

Obese stage III patients who undergo TKA procedures showed greater improvement in function compared with BMI > 45 kg/m^2 obese patients by Rajgopal V[11].

This study cleared that 89 patients had back pain versus 32 patients had no back pain, and seven patients only had hip pain versus 114 with no hip pain with insignificant P value < 0.27 and < 0.46, respectively. Our patients who were TKA candidates with considerable preoperative low-back pain should be counseled that TKA outcome may be impaired by the coexistence of spinal pathology, and that residual back pain may continue following otherwise successful TKA.

Although Collados-Maestre I[12] identified worse functional and patient-reported outcomes were obtained in patients over 65 years with concomitant low back pain. This was related to the intensity of preoperative low back pain and Staibano P[13] cleared that lower extremity osteoarthritis with concomitant low-back pain may obscure a clinician's ability to properly evaluate the status of hip or knee osteoarthritis and subsequent total joint arthroplasty candidacy.

In conclusion; Iraqi patients with higher body mass index required total knee arthroplasty at younger age with a lower level of knee society score and functional score.

Also, increased female gender dominant predilection with increasing BMI but patient gender didn't modify the time of the patient age in need of primary TKR. Obesity plays a little role to increase intra operative complications during primary TKR. We recommend that for obese patients in need of primary TKA should not be denied treatment based on their BMI only. Obese patients who are in need of TKA shouldn't be left without surgery because that will decrease their activity level and more burden risk regarding further increase in body weight and more surgical co morbidities.

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