

## Original Research Article

# Total knee arthroplasty at Gaza Strip Palestine: compliance and retrospective comparative study

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### ABSTRACT

**Background:** In Gaza Strip, arthroplasty only performed at our center. This study is to assess the compliance and improve current practices.

**Methods:** Study is based on medical records review of all patients underwent total knee arthroplasty (TKA) between January 2016 and December 2017.

**Results:** Forty eight TKA were performed on 41 patients. Neuraxial anesthesia used in 43 operations (30 spinal, 13 epidural). Tranexamic acid used in 20 operations and those show less frequently decrease in hemoglobin level after surgery and for blood transfusion. Simultaneous bilateral TKA used in one patient. Drain used in 26 operations, 2 of them had infection. No one started physiotherapy at same day surgery, this may be due to repeat doses of Epidural anesthesia, performed surgeries before weekend and using the drain. Delayed physiotherapy is associated with prolong hospitalization and increase suspicion of deep venous thrombosis. The result from our retrospective comparative study was similar to guidelines.

**Conclusions:** We concluded that there is overall good management of TKA in our hospital according to the best available evidence. We recommend to use the international guidelines like the American Academy of Orthopaedic Surgeons (AAOS) guidelines as a standard guidelines to our Hospital, and increase awareness of our staff to the good practice guidelines. Emphasize the important elements that we have shorten of good practice as listed in the discussion.

**Keywords:** American academy of orthopaedic surgeons, Total knee arthroplasty, Physiotherapy, Tranexamic acid, Drain, Post total knee arthroplasty, Deep venous thrombosis

### INTRODUCTION

Osteoarthritis (OA) is a worldwide problem.<sup>1</sup> It is a degenerative disease occur after damage of joint cartilage in between the bones, which lead to pain, swelling and stiffness of the joint resulting in disability. OA is most prevalent within elderly population. Obesity and lack of exercise are the most common preventable causes lead to osteoarthritis. Obesity and lack of exercise are common in Palestine according to National Health and Nutrition Survey (1999-2000).<sup>2</sup>

Arthroplasty is the main treatment for advanced OA.<sup>3</sup> It is an effective surgery to relieve pain, correct deformity, and help resume daily activities. First new modern total knee arthroplasty (TKA) was performed in 1968. Since then improvements in surgical materials and techniques have greatly increased its effectiveness. And is now one of the most successful surgical procedures for the treatment of knee osteoarthritis. TKA comprises a femoral, a tibial, plastic spacer and sometimes patellar component is used. The plastic spacer and patellar component are usually made of polyethylene, metal

alloys are generally used for both the femoral and tibial components, and these components replace the damaged cartilage at the bone surfaces.

Palestine and most Middle East countries are developing countries. Palestine is formed from west bank and Gaza Strip. In Gaza Strip, arthroplasty is only performed at our centre, it is introduced only in recent years. Gaza strip has a special situation, because political issue, it has been under blockade for many years now, which lead to the large poverty percentage and bad economy. Also this lead to have well trained qualified doctors and to get components and tools for TKA is very difficult which play a big rule to postpone the introducing of this surgery in Gaza strip. Moreover, people in Gaza cant travel because crossings around the strip are always closed.

The aim of this study is to evaluate the current practices at our center and if they are aligned with best practice and international guidelines, and this will improve our practice and decrease the morbidity and complications, and help us to offer the best safe procedure to our patients.

## METHODS

For this study, we retrospectively reviewed the medical records of all patients admitted to European Gaza hospital who underwent TKA between January 1, 2016, and December 31, 2017. Clinical practice was compared with recommendations from AAOS guidelines 2016 for total knee replacement<sup>4</sup>, and AAOS guidelines for preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty 2011.<sup>5</sup> Microsoft excel and statistical package for the social sciences (SPSS) was used for data collection and analysis.

### *Inclusion and exclusion criteria*

All patients admitted to European Gaza hospital who underwent TKA between 01 January 2016 and 31 December 2017 was included in this study.

## RESULTS

Out of 41 patients (28 females and 13 males with average age of 61.6 years) underwent TKA during study period, 7 had TKA on both sides at different time-point and 1 had TKA for both sides at the same time-point. Hence, a total of 48 TKA were performed. From those 41 patients we had 32 patients with comorbidities (Figure 1). Twelve patients diagnosed hypertension, 9 patients with diabetes and hypertension, 3 patients with diabetes, 3 patients with asthma, 1 patient with cirrhosis, 1 patients with hypertension and rheumatoid arthritis, 1 patient with hypertension and thyroidectomy, 1 patient thyroidectomy, 1 patient diabetic and thyroidectomy, and 9 patients had no comorbidities). We had five patients (10%) with complications, two of them (4%) had infections (one had hypertension, other had asthma),

other two had intraoperative bone fracture one had hypertension, other had both hypertensions and diabetes) and one with unknown to had comorbidities diagnosed post-operative deep venous thrombosis (DVT). Body mass index (BMI) was not calculated before surgery (0%). Neuraxial anesthesia used in 43 (89.5 %) operations (30 cases spinal, 13 cases epidural, one of the patients with epidural anesthesia diagnosed with postoperative DVT). General anesthesia in 5 (10.5%) operations with no anyone diagnosed with DVT. None had periarticular anesthesia (0%), or peripheral nerve blockade (0%).The tourniquet was use in all patient (100%). The tranexamic acid was used in 20 (41%) operations. Compared to patient who did not receive tranexamic acid, patients received tranexamic acid had lower decrease in hemoglobin level after surgery (3.46 vs. 1.47 gm/dl) with p value (0.000006) (Mann-Whitney test) (Table 1) and less need for blood transfusion (11.7% vs. 31%) (p=0.000138) (moses test) (Table 2). Antibiotic bone cement was used in 19 (41%) cases. Posterior cruciate ligament (PCL) retaining TKA, modular tibia components, cemented prosthesis and conventional instrumentation were used for all patients (100%). Drain was not used in 22 (45%) operations without associated infection, however, 2 (4%) of the remaining 26 (55%) operations had infection (Table 3). As we mention there are 8 patients underwent bilateral total knee arthroplasty. Simultaneous bilateral TKA has been performed for one patient with no unpredictable events (hemoglobin differences pre- and post-operative was 1.1 g/dl, no blood transfusion, no post-operative infection, start physiotherapy at first day after surgery and was discharged at 3rd day post-operative). For the other seven patients they did it at different time-point within average 1.3 years. Pre-operative physiotherapy was not reported in any patient and no one started physiotherapy at same day post-operative (0%). The most common causes for delayed physiotherapy is firstly performing surgeries on Thursdays (no one underwent surgeries on Thursday start physiotherapy at same day or 1<sup>st</sup> day post-operative) since physiotherapists do not work on Fridays. The other cause is the use and/or the repeat use of epidural anesthesia (which prolong lower limb anesthesia) especially when compared to patients who used non-epidural anesthesia (Table 4) (p<0.05) (Moses test). From 13 cases who did epidural anesthesia no one start same day physiotherapy, 3 start at first day, 8 start at second day and 2 start at third day) while the other 35 patients who used spinal and general anesthesia 22 patients start physiotherapy on first day, 10 patients start on 2<sup>nd</sup> day and 3 patients start on 3<sup>rd</sup> day. Third cause is using drain (from 26 cases had postoperative drain no one start physiotherapy at same day and only 7 cases start physiotherapy at 1<sup>st</sup> day postoperative). Delayed physiotherapy is associated with prolong hospitalization (The average of hospitalization length days 3.4, 4.7, 5.6 days for patients who started physiotherapy at 1st, 2nd, 3rd postoperative day respectively) (Table 5) and this observed when we compared hospitalization length days to patients start physiotherapy on first day (average 3.4) patients start

physiotherapy 2<sup>nd</sup> and 3<sup>rd</sup> days (average 4.9) (p value 0.000044) (Mann-Whitney test), also delayed physiotherapy increase suspicions of DVT, from 10 patients (2 start physiotherapy at 1<sup>st</sup> day, 8 start physiotherapy at 2<sup>nd</sup> and 3<sup>rd</sup> day) did duplex only one, who start physiotherapy at 1<sup>st</sup> day- proved with DVT. Neither continuous passive motion (CPM) nor cryotherapy not used in all cases (100%). rmacologic Pha

venous thromboembolism (VTE) prophylaxis (heparin/clexane) used in all patients after 12 hour post-operatively (100%). Extended pharmacological prophylaxis used in 25 cases (52%) after discharge (19 rivaroxaban, 5 warfarin, 1 clexan), while the rest 23 cases (13 baby aspirin, 10 without drugs) and no patients at all diagnosed with DVT after discharge (Figure 2).

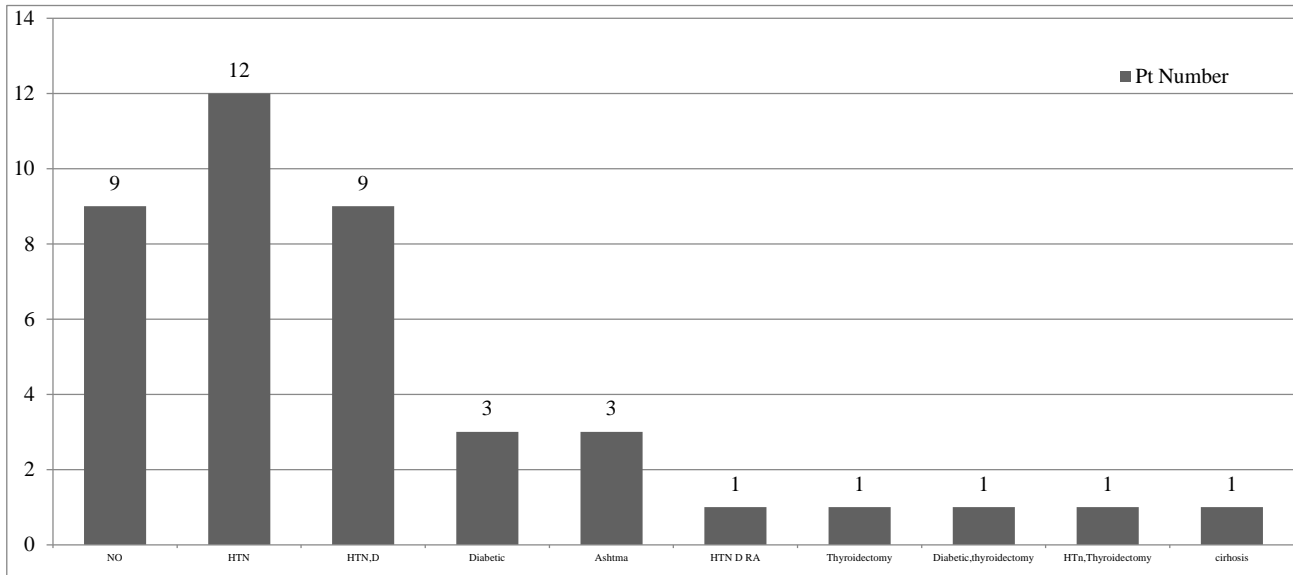


Figure 1: Number of patients with risk factor and comorbidities.

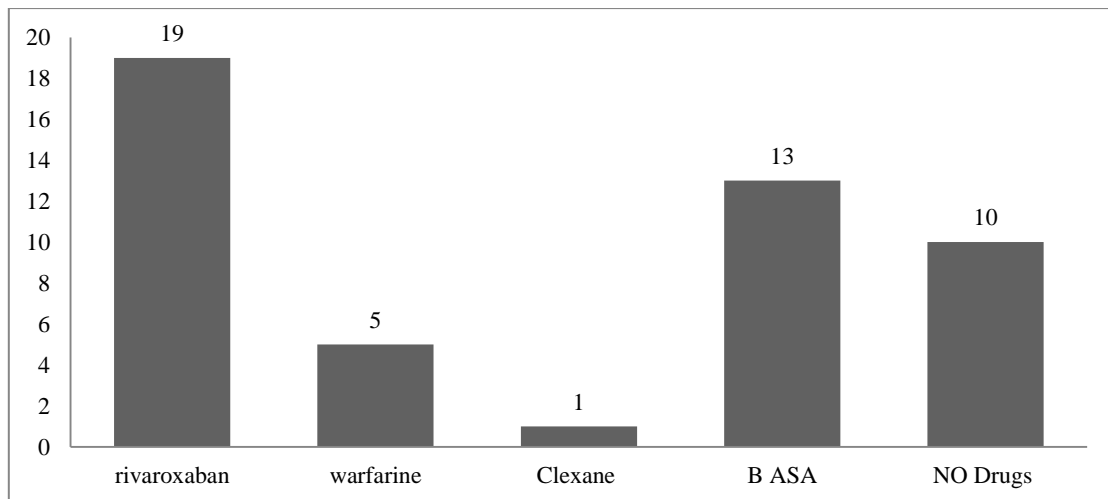


Figure 2 : Number of patients treated with extended pharmacological DVT prophylaxis.

Table 1: Pre and post-operative haemoglobin difference between patients who received tranexamic acid and those who did not received tranexamic acid.

	Tranexamic acid administered	Tranexamic acid not administered
No. of patient (%)	19 (39.6%)	29 (60.4%)
Mean HGB difference	1.47 gm/dl	3.46 gm/dl
SD	0.72	1.46

HGD: haemoglobin; SD: standard deviation.

**Table 2: Tranexamic acid effect on the need for postoperative blood transfusion.**

	No post-op transfusion	Post-op transfusion	Total
	N (%)	N (%)	
<b>Tranexamic acid administered</b>	17 (89.5)	2 (10.5)	19
<b>Tranexamic acid not administered</b>	22 (75.9)	7 (24.1)	29
<b>Total</b>	39 (81.3)	9 (18.7)	48

**Table 3: Incidence of infection associated with use of drain.**

	Infection	No Infection	Total
	N (%)	N (%)	
<b>Drain used</b>	2 (7.6)	24 (92.4)	26
<b>Drain not used</b>	0 (0)	22 (100)	22
<b>Total</b>	2	46	48

**Table 4: Types of anesthesia relation to physiotherapy starting day.**

		Epidural	Spinal	General	Total
		N (%)	N (%)	N (%)	N
<b>Starting physiotherapy</b>	1 <sup>st</sup> day	3 (23.1)	20 (66.7)	2 (40)	25
	2 <sup>nd</sup> day	8 (61.5)	9 (30)	1 (20)	18
	3 <sup>rd</sup> day	2 (15.4)	1 (3.3)	2 (40)	5
	<b>Total</b>	13	30	5	48

**Table 5: Hospitalization period in relation to physiotherapy starting day post-op (1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup>).**

	When started physiotherapy		
	1 <sup>st</sup> day	2 <sup>nd</sup> day	3 <sup>rd</sup> day
<b>No. of patient (%)</b>	25 (52.1)	18 (37.5)	5 (1.4)
<b>Hospitalization days (mean)</b>	3.4	4.7	5.6
<b>SD</b>	1.3	1.0	1.5

**DISCUSSION**

Care must be taken while dealing with patients who had a risk factor like diabetes, asthma and hypertension. In our study there is no complications associated with general anesthesia, we had trend toward using epidural anesthesia which is good for immediate post-operative pain relief but increase risk of DVT and prolonged hospitalization. There is mis-contact in between our teams as orthopedics and physiotherapists, we think it's better to inform the physiotherapists about time of surgery, so physiotherapist can help in pre-operative physiotherapy and start same day physiotherapy. There is a defect in preoperative preparation of the patient like pre-operative physiotherapy and measurement of BMI and also defect in witness post-operative physiotherapy. For those patients who receive tranexamic acid showed lower decrease in hemoglobin level after surgery and less need for blood transfusion during and after surgery. In intraoperative surgical techniques we had a very good alignment with the best practice. There is only one patient underwent simultaneous bilateral TKA with no complication, and we have seven patients underwent

TKA at two different point-time surgeries within average 1.3 years so, they underwent to two major surgery with all risks at short times which can be avoided by doing simultaneous bilateral total knee arthroplasty. This study showed increased risk of infection with using drain, two patients diagnosed with infections within those we used drain, while no one diagnosed with infection for those we didn't use drain, also using drain showed delayed in starting physiotherapy, this is may be explain as patient prefer to start physiotherapy after remove drain. This study showed there no patients had diagnosed with DVT after discharge in all who use extended pharmacological DVT prophylaxis (low molecular weight heparin, a vitamin K antagonist, dabigatran, rivaroxaban) and within those who didn't use drugs. This result need to be reviewed with larger further study.

This study directed our attention for number of gaps and imperfections in our practice. First, for anesthesia, we advice to use spinal anesthesia as standard anesthesia because it is safe rapid procedure, and if epidural anesthesia used we do not advice to repeat the injections as this will postpone the to start physiotherapy, increase

risk for DVT and prolong the hospitalization. This outcome is compatible with “Anesthesia for total knee arthroplasty” which recommend to use spinal anesthesia especially in unilateral TKR.<sup>6</sup> No one of our patients used periarticular local anesthetic infiltration, peripheral nerve blockade, but according to AAOS guidelines it’s effective procedure to decrease post-operative pain which is supported by 3 strong papers.<sup>7-9</sup> All of them recommend to use multimodal pain control and use periarticular infiltration and peripheral nerve block, So we recommend use periarticular anesthesia infiltration and peripheral nerve blockade.

Secondly, we remark the advantage to use tranexamic acid in all cases before surgery as this decrease the intraoperative blood loss and decrease the needs for blood transfusion postoperative and this outcome is similar to other studies recommendations.<sup>10-12</sup>

Thirdly, for simultaneously bilateral TKA: we advice to do simultaneously bilateral TKA, as its safe procedure with no increased complications and that will prevent patient to repeat the surgery in short time so avoid dangerous and complication of 2<sup>nd</sup> surgery and this is supported with other study.<sup>13</sup> “If patient need and meet the criteria, for patients aged 70 or younger or ASA status 1-2, because there are no increased complications”.

Fourthly, for drains we recommend not using drain post-operative in all cases this recommendation is similar to others studies.<sup>14,15</sup>

Fifthly, we mark the importance for counselling the plane of surgery with our physiotherapists so, we can do pre-operative physiotherapy and starting physiotherapy on same day of operation, as this will decrease hospital stay after surgery and decrease incidence of doing post-operative duplex and this is computable with other studies.<sup>16,17</sup>

### **Recommendations**

As we have no local guidelines. We recommend using the international guidelines like AAOS guidelines as a standard guideline to our hospital, and increasing awareness of our staff about using the good practice guidelines. Emphasize the important elements that we have shorten of good practice as listed in the discussion.

### **CONCLUSION**

We concluded that there is overall good management of TKA in our hospital according to the best available evidence.

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