



Research Paper

Do new trainees pose a threat to the functional outcome of total knee arthroplasty? – The ‘January/July’ effect in a developing South Asian country: A retrospective cohort study

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ABSTRACT

Introduction: Previous studies have shown that the introduction of new trainees/residents results in an increased morbidity and mortality for the hospital. With differences in induction times of residents across the world and majority of research coming from the US, we aim at studying whether the introduction of new orthopedic residents/trainees bode ill for patients undergoing a total knee arthroplasty (TKA) in a developing country.

Materials & Methods: Single center retrospective cohort study done from 2006 to 2015. Induction of new residents in Pakistan happens at the start of the year (January). A total of 673 patients who underwent a unilateral or bilateral TKA were included in study. Surgeries were divided into 4 quarters of the year and comparison was carried out between them. Binomial logistic regression analysis was also carried out for significant variables.

Results: Surgeries done during the first quarter (Jan–March) was not associated with a longer length of stay (LOS) [$p = 0.651$], a longer total operative time (TOT)[$p = 0.471$], a higher drop in hemoglobin (Hb) [$p = 0.146$] and postoperative complications. Surgeries done during the first quarter of the year are a significant independent predictor of postoperative cardiac complications [$p = 0.02$].

Conclusion: Based on our study, we found no evidence to support a hypothesis of new trainees/residents bringing about an increased intraoperative and postoperative morbidity. Further large multicenter database studies are required from the South Asian region to further study this effect.

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1. Introduction

The July effect, sometimes referred to as the July phenomenon is an apparent increase in postoperative morbidity, medical errors and surgical complications that take place during the months of July when medical school graduates in the US begin their residencies [1]. A similar phenomenon has also been observed in the United Kingdom and has been given the dramatic name of ‘The Killing Season’ [2]. A lot has been researched to see whether the influx of a newer inexperienced crop of residents is associated with ill-tidings for the hospital. However, the results have been contradictory with successive studies having different results [1–11]. Majority of these studies have been done in the US and these findings cannot be applied to other countries due to not only

differences in resources, preoperative and postoperative care but also due to different induction times of residents.

To our knowledge, there has not been a study investigating a similar effect from the South Asian developing countries where the induction of new residents usually begins with the start of every new year. We therefore deem it suitable to refer to this ‘July’ effect as the ‘January’ effect in our study. This inspired us to compare whether total knee replacements done during the first quarter of the year (Jan–March) was associated with a higher postoperative morbidity, coincident with the induction of fresh batch of inexperienced interns and residents.

Keeping in the mind the studies from our western counterparts, we too hypothesized that surgeries done during the first quarter of the year (Jan–March) would be associated with 1) higher postoperative LOS, 2) increased total operative and total anesthesia time, 3) increased intraoperative blood loss. We also hypothesized that inexperienced residents would be still learning the ropes during the first quarter of the year and because of this there would

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be a higher risk of postoperative complications such as surgical site infection (SSI), cardiac complications, urinary tract infections (UTI) and deep venous thrombosis (DVT) secondary to inappropriate delivery of care and medical errors.

2. Materials and methods

2.1. Patients

This was a retrospective study done at Aga Khan University Hospital from January 2006 to December 2015. Our hospital is a major tertiary care academic hospital situated in the city of Karachi, Pakistan and caters to an estimated population of over 20 million. There are a total of nine consultant orthopedic surgeons who perform a total of 500 knee and hip arthroplasties annually. After exemption approval from the Ethical Review Committee of Aga Khan University, we accessed records for all total knee arthroplasties done within this time period. The protocol of the study was developed prior to the initiation of data collection and is registered with the Ethical Review Committee of Aga Khan University. All patients, regardless of gender, comorbidities and age who underwent a unilateral or bilateral TKA were included in the study. Those patients who underwent a revision TKA were excluded from the study. Those patients who had missing data were also excluded from the study. Out of a total of 725 patients, 673 patients were included in the final analysis. Flow charts of patients included is shown in Fig. 1. Total knee arthroplasties were performed by consultant orthopedic surgeons with residents assisting during the procedure. All patients underwent a standardized preoperative antibiotic protocol which was started an hour before surgery and continued for the next 24 h. Intraoperatively, incision site was cleaned using povidone prep before draping. The surgery was performed by an attending surgeon with up to two residents (a senior and a junior) assisting during the procedure. All patients underwent a standard postoperative protocol in the inpatient ward including mobilization and physiotherapy. Of note, in our part of the country majority of the rehabilitation protocols are carried out while the patient is admitted in the ward. This is one of the major factors why our mean length of stay is much higher when compared to our developing western counterparts. Patients were closely followed up after discharge for 30 days to monitor for any

postoperative complications that might have developed. The study was reported in line with the STROCCS criteria [12]. The research study has been registered at ResearchRegistry.com in accordance with the declaration of Helsinki (researchregistry3052).

2.2. Methods

Medical records were reviewed and noted on a proforma. We recorded demographic data (age, gender, comorbidities, ASA grade, date of surgery) and Clinical Data (Type of surgery, TOT, TAT, LOS, intraoperative Hb drop, the need for postoperative transfusion, postoperative Special care unit (SCU) stay, postoperative complications during stay and within 30 days. LOS was defined from the day of admission to day of discharge. Total operative time was defined from skin incision to wound closure. Postoperative complications included urinary tract infection (UTI), deep vein thrombosis (DVT), Surgical Site Infection (SSI) and cardiac complications. We used preoperative and postoperative hemoglobin values to calculate the intraoperative hemoglobin drop as an indicator of intraoperative blood loss.

Our hospital offers a six year residency programme in Orthopedic surgery with four positions being offered annually. Throughout the hospital, the first day of the new residents begins on the first of January. This date is appropriately set as majority of the medical schools in Pakistan complete their MBBS (Bachelor of Medicine, Bachelor of Surgery) programme by end of October/November. Therefore, we aimed at evaluating whether the presence of inexperienced fresh residents during the first quarter of the month was associated with a higher postoperative morbidity. Month of surgery was extracted from the date and was appropriately set as a categorical variable with 1 = January, 2 = February, 3 = March and so on. We then decided to divide the months into quarters of three months each with 1 = (January–March), 2 = (April–June) and 3 = (July–September) and 4 = (October–December). Analysis was then carried out between these groups.

Our primary continuous outcome variables – Length of stay (LOS), Total Anesthesia Time (TAT), Total operative time (TOT) and intraoperative hemoglobin (Hb) drop were skewed according to both Kolmogorov-Smirnov tests and Shapiro-Wilk tests therefore the Mann-Whitney U Test and Kruskal-Wallis test for nonparametric scale variables were used accordingly for the analysis of data. Eta-Squared effect size values were calculated for our primary

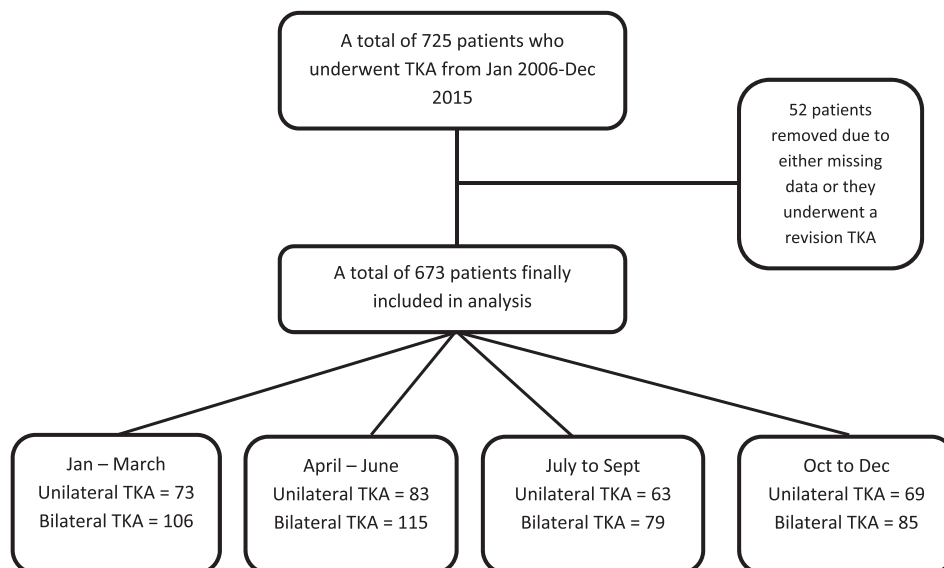


Fig. 1. Flowchart showing inclusion of patients into the study.

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