Research Article

Current Trends Regarding Perioperative Pharmacological Anticoagulation in Lower Limb Surgeries among Orthopedic Surgeons of Pakistan- A Critical Survey

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Abstract: Perioperative anticoagulation has been recommended by AAOS, AACP, and ASH during orthopedic procedures of the lower limb. Guidelines show a difference of opinion regarding the optimum duration and drug of choice giving a way to use different methods of anticoagulation. This survey assessed the differences in preferences for pharmacological anticoagulation in lower limb surgeries among orthopedic surgeons of Pakistan.

Materials & Methods: Orthopedic surgeons (n=632) were invited to fill in the questionnaires. A total of 85 orthopedic surgeons responded completely. An electronic eight-question survey was designed which included questions about demographics of surgeons, the drug of choice, perioperative duration, preferred surgeries, and average incidence of thromboembolism per year.

Results: 12.9% surgeons use anticoagulation for all surgeries while 82.3% of orthopedic surgeons use anticoagulants in selective surgeries. LMWH (94.1%) and Rivaroxaban (17.6%) were the drug of choice for most surgeons. 70.6% of respondents never used anticoagulation preoperatively. 17.7% used it three days preoperatively. 28.24% of surgeons prescribed anticoagulation for 3 days postoperatively while 17.7% of surgeons prescribed anticoagulation for 2 weeks postoperatively. 10.6% of surgeons never used anticoagulation postoperatively. Arthroplasty (71.7%), trauma (55.3%), and pelvis and acetabulum (54.1%) were the subspecialties with routine anticoagulation. 81.2% and 17.7% of surgeons reported less than 1% and 1% to 3% incidence of thromboembolism, respectively. No surgeon reported any incidence of thromboembolism above 5%.

Conclusion: Use of anticoagulation is prevalent among orthopedic surgeons in Pakistan. However, significant differences are observed regarding the perioperative duration. The surgeons need to prescribe DOAC such as Rivaroxaban and Dabigatran as agents of choice while extended postoperative pharmacological anticoagulation of 28-35 days needs to be adopted.

Keywords: Anticoagulation, Orthopedic surgery, Preventive medicine, Thromboembolism, Lower limb, Pulmonary embolism.

INTRODUCTION

Venous thromboembolism (VTE) can be deep vein thrombosis (DVT), pulmonary embolism (PE), or both. Annually 300,000 to 600,000 Americans are affected by VTE causing severe morbidity and mortality [1]. Prevalence of VTE is greater in Western countries than Asian countries but have augmented with time [2]. VTE is preferentially common in lower limb surgeries than in the upper limb [3]. It is the most feared and dreadful complication of lower limb surgeries which if left unaddressed can give rise to life-threatening pulmonary embolism. Acquired conditions such as malignancy, infection, inflammatory diseases, pregnancy, immobilization, and diabetes increase the risk of VTE postoperatively in lower limb surgeries. The most common presentation of lower limb VTE is swelling (seen in 70% of patients) followed by pain (seen in 50% of patients) and redness [4]. Mostly, events of VTE occur within 30 days postoperatively in all types of orthopedic surgical procedures [5]. Pre-test probability using Well's criteria along with D-dimer is the predictive modality for VTE [6].

The use of VTE prophylaxis in all major orthopedic surgeries is the norm in western countries, where the guideline including the American Society of Hematology (ASH), American College of Chest Physicians (ACCP), American Academy of Orthopedic Surgeons (AAOS), National Institute for Health and Care Excellence (NICE) have recommended the use of prophylaxis preoperatively [7-9]. But most guidelines hold a difference of opinion regarding the optimum duration and drug of choice. However, the guidelines have defined the least and maximum possible durations while the optimum duration

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remains yet unclear thereby paving a way for the clinicians to opt for different anticoagulation. The variability in the practice of VTE prophylaxis may lead to benefits as well as poor outcomes with differences in success and failures from one surgeon to another.

Hence the prophylaxis against VTE is of utmost importance and highly recommended in various studies [10]. This study aims to assess the differences in preference for pharmacological anticoagulation in lower limb surgeries among orthopedic surgeons of Pakistan whereby observing the current trends among orthopedic surgeons regarding duration and the incidences of VTE faced by them. The results may also represent the most suitable and convenient anticoagulation regimen for clinical use by considering the incidences of VTE, choice of drug, and duration reported by different surgeons.

MATERIALS AND METHODS

A cross-sectional study was designed by the authors. The population under consideration for this survey was Orthopaedic surgeons of Pakistan who were registered in Pakistan Orthopaedic Association (POA). The request to participate was sent to 632 orthopedic surgeons of which only 85 responded. After ensuring privacy, consent was taken from all participants.

The study started in June and finished in September, with a total duration of 4 months. The tool for this survey was an electronic questionnaire which consists of eight self-generated close-ended questions sent through social media accounts and e-mails with two reminders one week apart.

We divided our questionnaire into three sections. In the first section, two questions were asked related to the basic information of respondents i.e. designation of surgeon and numbers of years in practice. In the following part, questions asked were regarding the preferred anticoagulants for VTE in orthopedic surgeries and its administration duration before and after surgery. The third section was regarding the average incidence of thromboembolism faced per year and the type of surgery in which they consider the use of anticoagulants.

STATISTICAL ANALYSIS

After response collection, organizing, coding, and tabulating were performed in SPSS version 22 (IBM Corp. Armonk, NY) and Microsoft Office Excel. The statistical analyses included descriptive statistics.

RESULTS

Out of 85 respondents, the majority were assistant professors i.e. 40% (n=34). With remaining to be a consultant or senior registrar (36.47%), Associate Professor (9.41%), and Professor (14.21%). When asked about years of experience i.e. for how long they have been practicing orthopedics, only 16.47% had more than 20 years of experience, with 24.71% were in practice only for less than five years while 10, 21, 54 performed less than five surgeries per day, five to ten surgeries per day, and more than 10 surgeries per day, respectively. 31 (36.47%) and 54 (63.53%) of the respondents were working on the secondary and tertiary levels of the healthcare system, respectively. The data are summarized in Table **1**.

Table 1. Characteristics of the Participants Responding to the Survey.

Characteristics	**n (%)**
Designations	
Consultants	31 (36.47%)
Assistant Professor	34 (40%)
Associate Professor	8 (9.41%)
Professor	12 (14.12%)
Duration of practice	
Less than 5 years	21 (24.71%)
5 to 10 years	27 (31.76%)
10 to 20 years	23 (27.06%)
More than 20 years	14 (16.47%)
Level of the healthcare system	
Secondary healthcare system	31 (36.47%)
Tertiary healthcare system	54 (63.53%)
Surgeries performed per week	
Less than 5	10 (11.76%)
5-10	21 (24.71%)
More than 10	54 (63.53%)

Regarding the prescription of anticoagulants, a majority (82.35%) claimed that they have prescribed the anticoagulant sometimes during their orthopedics practice in contrast to only 12.94% that has always used the anticoagulant. Only 4 out of 85 doctors (4.71%) had never prescribed. LMWH turned out to be the most commonly used drug with 94.12% of respondents. Other drugs that were being in use are Rivaroxaban (17.65%), Warfarin (9.41%), and Unfractionated Heparin (7.06%) (Fig. **1**). The majority of the doctors (70.59%) have never used anticoagulation before surgery with only 9.4% used 1 week before surgery. None of them had used it 2 weeks before surgery (Fig. **2**). Responses were variable regarding the postoperative duration of anticoagulation with 24.28% reported using three days after surgery while 17.65% used till two weeks after surgery. 5.8% were able to continue till 4 to 6 weeks (Fig. **3**)

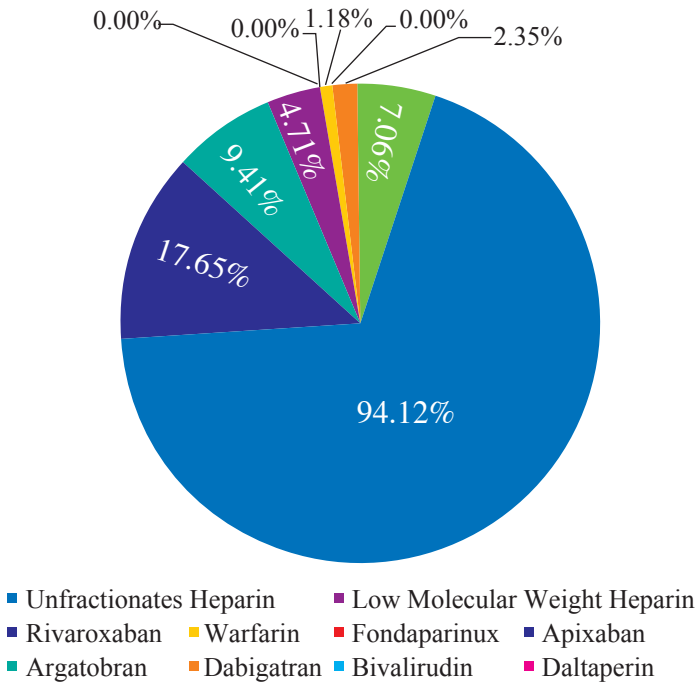

Fig. (1). Trend Regarding the Preference of Drug for Pharmacological Anticoagulation.

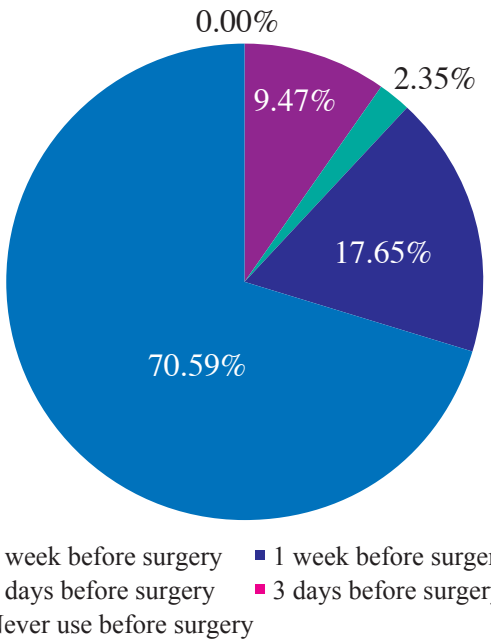

Fig. (2). Trend Regarding the Preoperative Days for Pharmacological Anticoagulation.

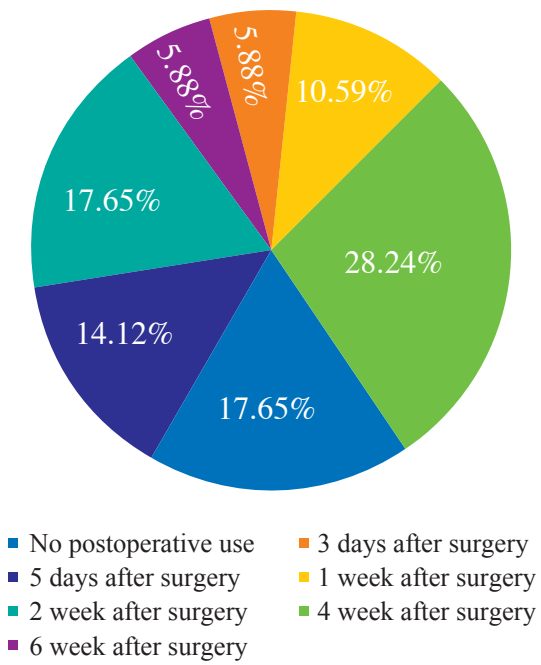

Fig. (3). Trend Regarding the Postoperative Days for Pharmacological Anticoagulation.

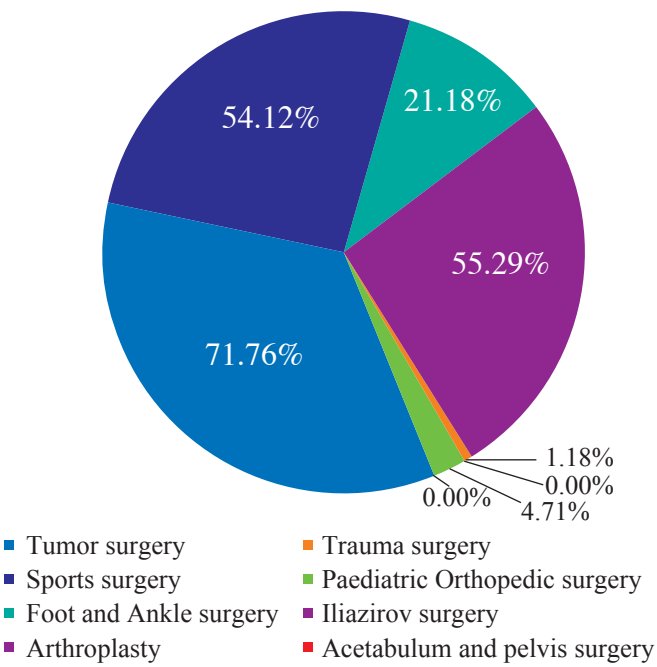

Fig. (4). Trend Regarding the Use of Pharmacological Anticoagulation for Different Types of Orthopedic Surgeries.

Orthopedic surgeons were then inquired about the incidence of thromboembolism in the last one year as per their observation for which 81.18 % responded it to be less than 1% with 17.65% and 1.18% reported 1-3% and 3-5% respectively. The most commonly preferred surgery for pharmacological anticoagulation was arthroplasty (71.76%) while pharmacological anticoagulant was also further employed by a majority of surgeons in Trauma Surgery (55.3%) and Acetabulum & Pelvis surgeries (54.1%) (Fig. **4**).

DISCUSSION

Anticoagulation is recommended for lower limb surgeries across the world due to immobilization, major surgical approach, and use of prosthesis [11, 12]. However, the guidelines differ in terms of recommendation in choice of drugs, duration of anticoagulation, dosing, and mechanical anticoagulation methods. The variability in guidelines has led to differences in clinical practice among different orthopedic surgeons. This survey was carried out to analyze the possible differences in pharmacological anticoagulation with the success achieved in avoiding VTE as per the individual practice of clinicians. The results may further be used to uplift the standard of patient care regarding VTE prophylaxis by providing appraisals in clinical practice.

The results reflect the satisfactory use of pharmacological anticoagulation as an overwhelming majority of surgeons are using it. The literature has not recommended pharmacological anticoagulation for low-risk patients going through cast and plaster, lower leg, foot, and ankle surgeries, and minor surgeries [13, 14]. Hence, we asked whether the surgeons have used pharmacological anticoagulation for all lower limb surgeries or selective surgeries. The responses showed that 82.35% of them used anticoagulation selectively. Arthroplasties and pelvis acetabulum surgeries are considered the most thrombogenic surgeries with the highest rate of VTE so anticoagulation is recommended [15, 16]. Our results show that 71.76 and 51.5% of surgeons use anticoagulation for these surgeries. However, 55.1% of respondents used anticoagulation for trauma surgeries. According to recent literature, pharmacological anticoagulation should be advised cautiously in trauma patients prioritizing mechanical prophylaxis over pharmacological prophylaxis due to the high risk of bleeding whereas widespread use of pharmacological anticoagulation is of serious concern in trauma patients [17]. The respondents reported LMWH as the most commonly used drug. However, recent clinical trials have reported better and more convenient results with Rivaroxaban, and Dabigatran which can be taken orally avoiding needle-stick infection and needle phobia among patients [18, 19]. In our results, only 17.65% of surgeons were using Rivaroxaban while none of the respondents knew about Dabigatran. Direct oral anticoagulants (DOAC) need to be adopted as they may increase patient compliance in extended use.

Preoperative anticoagulation in lower limb surgeries due to immobilization and associated fracture should be practiced with a bridging therapy by LMWH 5 days before surgery [20]. However, few surgeons (29.45%) are using anticoagulation preoperatively while a majority of surgeons are not using it preoperatively. This might result in VTE preoperatively and dislodgement during surgery. AAOS has recommended 2-weeks VTE prophylaxis postoperatively while ASH and ACCP have recommended extended 5-week use of VTE prophylaxis after major lower limb orthopedic procedures. Hence, a wide variation is observed in our results arising from 2-week to 6-week use of pharmacological anticoagulation.

From recent data, 1-3% of incidences of VTE are acceptable after major surgeries [21]. From our survey, we found that 81.18% of surgeons faced less than 1% of incidences of VTE per year. The results reflect that no regimen is superior to others in terms of VTE prophylaxis as all the surgeons have a similar rate of success. However, VTE prophylaxis that is cost-effective, convenient for patient and clinician, and with the lowest adverse effects should be brought into clinical practice as a superior VTE prophylaxis regimen.

The response rate was low due to time limitations and busy schedules under the COVID-19 pandemic of surgeons which is the major limitation to this survey.

CONCLUSION

We may conclude that the use of anticoagulation is prevalent among orthopedic surgeons in Pakistan. But significant differences are observed regarding the duration. However, no regimen can be claimed superior to others as all are reporting a low incidence of thromboembolism. Time, adverse effects, cost-effectiveness, and convenience should be investigated to suggest the best perioperative pharmacological anticoagulation. The surgeons need to prescribe DOAC such as Rivaroxaban and Dabigatran as newer and safer agents of choice while extended postoperative pharmacological anticoagulation of 28-35 days needs to be adopted.

AUTHORS' CONTRIBUTION

Sheikh Muhammad Ebad Ali: Critical revision, Data acquisition, Data interpretation, Data analysis.

Badaruddin Sahito: Critical revision, Data acquisition.

Syeda Iqra Qadri: Data collection, Drafting, Data analysis.

Hira Iqbal Naviwala: Data collection, Drafting, Data analysis.

Omer Awan: Data entry, Data collection, Drafting.

MMuhammad Mohsin Mushtaq: Data entry, Data collection, Drafting.

CONFLICT OF INTEREST

Declared none.

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