INDISCRIMINATE COAGULATION TESTING FOR BLEEDING RISK ASSESSMENT PRIOR TO ORTHOPEDIC SURGERY. IS IT A RATIONAL APPROACH?

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ABSTRACT

Objective: Indiscriminative preoperative coagulation testing to identify patients at risk of bleeding is commonly practiced. However, this practice is no longer supported by current recommendations. We conducted this study with an aim to evaluate the advantage of doing screening testing for coagulation and hemostasis in unselected patients prior to elective orthopedic surgeries in our setting.

Material and Methods: It was a retrospective, cross sectional study carried out at Medicare Cardiac and General Hospital, Jinnah Medical and Dental College, Karachi. All the patients admitted for elective orthopedic bilateral total knee replacement and Hip replacement surgeries from March 2016 to December 2018 were included in the study. Electronic data of patients' pre-operative test results for Prothrombin time, activated partial Thromboplastin time was retrieved. Frequency of patients with deranged coagulation screening was calculated.

Results: A total of 367 patients underwent pre-surgical coagulation testing. Male to female ratio was 1:3. Median age of patients was 61±5 years. A total of 2.9% (n=11) patients were found to have deranged coagulation profile. Out of which 3 patients did not undergo surgery and were loss to follow up. Out of total 0.54% (n=2) patients had both prolonged PT and APTT, 1.6% (n=6) patients had prolonged APTT and 0.3% (n=1) patient experienced intraoperative bleeding requiring one unit of packed cell transfusion. Only 0.3% (n=1) patient experienced post-operative bleeding and dropped her Hemoglobin and received transfusion.

Conclusion: The overall results of the study suggest that indiscriminate coagulation screening does not provide any additional information unless further detailed hemostatic evaluation is carried out. It is suggested that routine screening tests should not be performed unless a medical history is indicative of bleeding tendency.

Key Words: Coagulation screening, Bleeding risk, Orthopedic surgery.

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INTRODUCTION

Normal hemostasis has complex dynamics of fine balance between pro-coagulant and anticoagulant mechanisms maintaining the fluidics of blood [1] and when endothelial barrier of blood vessels is damaged it sets up chain of sequential events, in an ordered fashion from vasoconstriction, platelet plug formation, thrombus generation, recanalization and healing [2].

Bleeding remains an important complication of all invasive procedures. It is commonly aspired to identify patients at the risk of bleeding ahead of any invasive procedure and for which all credence is given to laboratory-based testing [3]. Indiscriminative preoperative coagulation testing using PT (Prothrombin time) and APTT (Activated Partial Thromboplastin time), to identify unselected patients at risk of bleeding is commonly practiced. However, this practice is no longer supported by current recommendations [4]. Prolongation of PT occurs in various conditions for instance liver disease, vitamin k deficiency, warfarin therapy and FVII deficiency. INR was introduced to reduce variation between laboratory results and standardize the PT reporting. It is used for monitoring patients on warfarin therapy [5, 6]. On the other hand, APTT is measure of common and intrinsic pathway and unlike PT, it is not standardized. A prolonged APTT needs further evaluation by mixing studies and factor assay to establish the cause [7].

British Committee for Standards in Hematology (BCSH) guideline reports analysis of nine observational studies concluding that positive predictive value (0.03-0.22) and likelihood ratio (0.94-

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5.1) of screening coagulation tests revealing that they are poor predictors of bleeding [4]. Moreover, generally 2.5% of healthy subjects without any bleeding propensity show deranged coagulation screening results [8, 9]. The role of PT and APTT for determining pre-operative bleeding assessment remains debatable [10,11]. On the other hand, it may delay the surgical procedure and burden of laboratory work without any significant benefit in clinical outcome [12]. Furthermore, even in developed countries millions of plasma units are transfused to non-bleeding patients prior to invasive procedures, mostly such decisions are provoked by coagulation screening tests [13].

Globally the practices are changing towards implementation of detailed bleeding history on scored based questionnaire directed towards further laboratory evaluation of only those with higher bleeding scores. Pakistan is a resource constrained country with underdeveloped health system and lack of accreditation body to assure adherence to standard clinical and laboratory practices including pre-surgical coagulation workup. Based on these findings we conducted this study with an aim to evaluate the advantage of doing screening testing for coagulation and hemostasis in unselected patients prior to elective orthopedic surgeries to identify patients with increased risk of bleeding. The findings may help us to solidify our evidence towards irrational laboratory testing. Additionally, it will also support to change the practices towards implementation of questionnaire-based bleeding history prior to all invasive procedures.

MATERIAL AND METHODS

It was retrospective cross-sectional study carried out at Medicare Cardiac and General Hospital, Jinnah Medical and Dental College, Karachi. It is a 100 bedded General hospital and deals mainly with Gynecology and Orthopedics specialties. Routine Prothrombin time (PT), Activated Partial Thromboplastin time (APTT) is part of pre surgical workup in orthopedic unit. Samples are collected in commercially available Sodium citrate tubes. Commercial normal and high controls are run before setting up the batch of tests. Electronic record of test results is saved in database.

Tests are performed on using Thrombomiter 2 (Behnk Electronik), which uses opto-mechanical measuring system. The normal values of PT and APTT are defined to be 11± 2sec and 27±3 seconds respectively. The test values between two standard deviations of normal controls were determined as normal. Test values with variation of two seconds above normal values were also regarded as normal. Test results which do not fall within these limits are considered as abnormal values.

All the patients admitted for elective orthopedic bilateral total Knee replacement and Hip replacement surgeries from March 2016 to December 2018 were included in the study. All the patients underwent routine pre-procedure Anesthesia evaluation. Electronic data of patients' pre-operative test results for Prothrombin time (PT), Activated Partial Thromboplastin time (APTT) was retrieved. Frequency of patients with deranged coagulation screening was calculated and post and intra operative out come in terms of bleeding was observed. Data was analyzed using SPSS version 19.0 (SPSS Inc., Chicago, IL, USA)

The study was approved by institutional ethical review committee (ERC approval Protocol I # 000145/21). Patient information and confidentiality was ensured throughout the data collection procedure. Only authorized investigator had the full access to patients' identification.

RESULTS

Results reveals that during the study period a total of 367 patients were tested. Male to female ratio was 1:3. Median age of patients was 61 ± 5 years. Of all tested 97.1% (n=356) patients had normal coagulation screening results. A total of 2.9% (n=11) patients were found to have deranged coagulation profile and out of 2.9% (n=11) patients with abnormal test results, 3 patients did not undergo surgery and were loss to follow up. 0.54% (n=2) patients had both prolonged PT and APTT. 1.6% (n=6) patients had prolonged APTT (Figure-I).

Only one 0.3% (n=1) patient out of these with abnormal coagulation profile experienced intraoperative bleeding and received one unit of packed cell transfusion. Only 0.3% (n=1) patient with deranged PT and APTT experienced post-operative bleeding and dropped her Hemoglobin requiring transfusion (Figure-II). All of these patients were managed in orthopedic surgical unit, further hemostatic workup or evaluation by hematology team was not made. The combined cost of these tests is 1110 PKR (7 USD). The total amount spent on these patients for coagulation workup was 407,500 PKR (2425 USD).

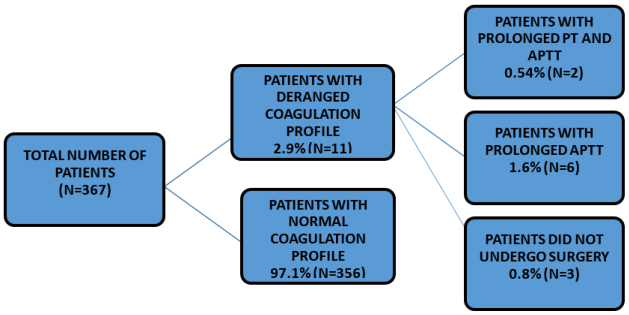

Figure-I: Details of coagulation screening profile (PT and APTT) of total patients.

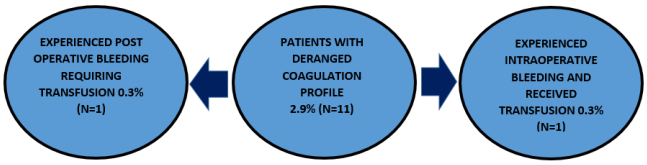

Figure-II: Outcome of patients with prolonged PT and APTT.

DISCUSSION

Our study results show that 97% of patients tested, had normal coagulation profile which greatly undermines the significance pre-surgery coagulation screening of unselected patients. This practice is based on belief that it helps identifying patients with both congenital and acquired coagulation defects for timely intervention before surgery [8]. In spite of that such practices are not cost effective and unreasonably burden on the health system.

In our study only 2.9% of people were reported to have deranged coagulation test results, which are quite comparable with study carried out by Azzah *et al* [14] who concludes that out of 2078 patients tested, 3.7% have abnormal coagulation screening, out of which only 0.14% experienced post-operative bleeding.

W. Eberl *et al* [15] aimed at identifying the positive predictive values of screening tests in ENT surgeries and they summarized that positive predictive value of bleeding history 9.2% remained higher than coagulation testing which is 6.8%, which again emphasizes on bleeding history than laboratory testing. In a study where a total of 2078 patients were screened, only three were truly benefited that too when further testing was performed. Two were diagnosed with VWD and one with FXI deficiency [14]. Considering the number of patients tested at the cost of consumption of both monetary and material resources, it outweighs the actual benefit achieved.

Apart from the primary objective of the study, the points that should be considered are isolated deranged coagulation testing is of no value, it should be further evaluated to establish the cause. Additionally In view of healthy patients, none of the test results were repeated to rule out non analytic element of erroneous results.

In our study 0.6% of the patients experienced bleeding, dropped their Hemoglobin and required transfusion. However, other elements that might influence intraoperative haemostasis such as administration of drugs and ambient temperature, were not documented. Other conditions such as acidosis and hypothermia may impede hemostasis [19, 20] resulting into bleeding with subsequent transfusion.

Application of standardized bleeding questionnaire in place of routine coagulation screening testing is advised in pre surgical assessment of patients which should include family history, clues about prost traumatic or post-surgical bleeding, and detailed drug history [16,17] If evident from history, coagulation testing should be performed and referral to Hematology clinic should be made to further evaluation and management. N Maurin [18] suggests a graded approach to rule out the risk of bleeding in patients going for elective surgical procedures, from history to clinical examination followed by platelet count and coagulation screening tests and if none of them is suggestive of bleeding risk no further evaluation should be made.

In a country where 4 out of 10 people live in Multidimensional Poverty and more than 20% of population live below poverty line, wasting of financial resources with very negligible benefits would be a major concern when the developed countries have already excluded these irrational testing as per their guidelines. A planned change of practices is required with initially sorting out high risk patients according to their scores on questionnaire-based bleeding history, followed by screening coagulation tests. Patients with deranged initial coagulation profile should be further evaluated by laboratory investigation and detailed Hematology review. Patients with no such red flags on initial assessment should not be tested further. Such practical approach will save time and resources with reduction in undue anxiety.

CONCLUSION

In totality the study findings indicate that indiscriminate coagulation screening does not provide any additional information. It is suggested that routine screening tests should not be performed unless a medical history is indicative of bleeding tendency. There is a dire need to bring awareness concerning limitation of routine coagulation testing. Ensuring quality care by identifying patients at risk of bleeding initial with help of comprehensive bleeding history

and examination before any invasive procedure is the best alternative, especially in developing world with resource constraints.

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AUTHOR CONTRIBUTION

Maria Ali: Retrieval of data from files and writing of manuscript & analysis of data.

Huma Mansoori: Technical help in writing of manuscript especially discussion.

Sidra Asad Ali: Analysis of data with layout of figures.

Veena Kumari and Mehreen Mehmood: Entry of data in SPSS and analysis.

Mahadev Harani: Review of manuscript and correction of references.

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