Venous thromboembolism prophylaxis in traumatic brain injury patients: An audit of clinical practice in AlRass General Hospital, Saudi Arabia and proposal for future clinical practice

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Abstract

Objectives: To review clinical practice with regards to venous thromboembolism prophylaxis in traumatic brain injury patients and to propose guidelines.

Methods: The retrospective study was conducted at Al Rass General Hospital, Saudi Arabia, and comprised medical records of all traumatic brain injury patients admitted to the Neurosurgery Department between November, 2017, and January, 2018. Data was noted using a proforma. Literature review was done to ascertain best clinical evidence and proposed guidelines for practice.

Results: Of the 26 patients, 23(88.5 %) were males, and 3(11.5 %) were females. The overall mean age was 32.2±13.4 years. Of the total, 8(30.8%) patients had mechanical venous thromboembolism prophylaxis, while 1(3.8%) received enoxaparin as chemoprophylaxis. There were no reported thromboembolic events or complications related to enoxaparin usage.

Conclusion: The usage of venous thromboembolism prophylaxis was found to be low in clinical practice. A modified Parkland Model approach seemed the most appropriate to avoid venous thromboembolism related events.

Keywords: Traumatic brain injury, TBI, Venous thromboembolism, VTE, Prophylaxis, Enoxaparin. (JPMA 70: 1052; 2020)
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Introduction

Traumatic Brain Injury (TBI) is the commonest diagnosis amongst neurosurgery admissions at our hospital. TBI could be an isolated brain injury or could be part of polytrauma. It is classified into mild, moderate and severe brain injury according to the Glasgow Coma Scale (GCS) scored of the patient at time of presentation. GCS 13-15 is classified as mild, 9-12 as moderate and 8 or below is classified as severe brain injury.[1]

Venous thromboembolism (VTE) is a potentially serious complication in hospitalised patients and several ways have been considered to stratify patients into various risk groups and decide upon the best prevention strategy. Our hospital currently follows the Caprini Risk assessment score for all hospitalised patients.[2] However, the Caprini system does not specifically include neurosurgery patients, including TBI patients.

TBI patients, especially those with moderate and severe brain injury, are likely to be immobile for a considerable period of time. There is also the possibility of neurological deficit, including limb weakness. Risk of VTE in such TBI patients can be as high as 54%.[3] To our knowledge, incidence of VTE in TBI patients has not been reported from the region. A recent study from Saudi Arabia on critically ill hospitalised patients reported the incidence of VTE of approximately 10% despite prophylactic measures.[4] Luckily, most of these VTE incidences were asymptomatic, but a complicated deep venous thrombosis (DVT) leading to pulmonary embolism (PE) could prove fatal.

The concern that intracranial bleeding may increase in TBI patients with VTE chemoprophylaxis makes the treating medical team reluctant to commence such a prophylactic treatment.

The current study was planned to audit our current clinical practice with regards to VTE prophylaxis in TBI patients, and to propose guidelines for future use in the light of literature.

Materials and Methods

The retrospective study was conducted at Al Rass General Hospital (ARGH), Saudi Arabia, and comprised medical records of all TBI patients admitted to the

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Neurosurgery Department between November, 2017, and January, 2018. ARGH is a 325-bed secondary care facility under the Ministry of Health in the Al-Qassim Province, providing neurosurgery service to all spectrum of TBI patients.

Electronic case notes were reviewed to ascertain the clinical practice with regards to prescription of mechanical and chemoprophylaxis.

The audit included all patients aged 16 years or above admitted to the Neurosurgery Department with TBI. Those with concomitant bleeding tendencies, or patients known to be on anticoagulation therapy were excluded.

Descriptive statistical analysis and data was expressed as frequencies and percentages.

Results

Of the 26 patients, 23(88.5 %) were males, and 3(11.5 %) were females. The overall mean age was 32.2±13.4 years. TBI was mild in 16 (61.5%) patients, moderate in 2(7.6%), and severe in 8(30.8%). Also, 11(42.3%) patients had polytrauma, and 3(11.5%) underwent neurosurgical procedures involving craniotomy and decompression.

Of the total, 8(30.8%) patients had mechanical prophylaxis, while 1(3.8%) received enoxaparin as chemoprophylaxis. There were no reported complications related to the use of enoxaparin, and there were no thromboembolic events either.

Discussion

About one-third of our patients were noted to have mechanical prophylaxis. This result is likely an underestimate and not truly representative, given the retrospective nature of the study. It is difficult to ascertain application of mechanical prophylaxis unless it was mentioned in the electronic notes or prescription charts.

Only one of our patients had VTE chemoprophylaxis, indicating a reluctance out of the fear of an expanding intracranial haematoma related to enoxaparin. This particular patient belonged to the severe injury group. The time lapse between admission and prescription of enoxaparin in this case was 11 days.

We realised that the current Caprini-based scoring system[2] used in our surgical setting is not relevant to TBI patients. It is based on the presence or absence of 20 different variables and the initial study was based on general patients.[2] Our local protocol based on this system permits omitting any chemoprophylaxis as intracranial bleeding is considered a contraindication.

Several studies have been performed regarding this issue and, so far, no consensus exists. According to the Brain Trauma Foundation (BTF),[5] there is Level III evidence that chemoprophylaxis in addition to compression stockings may be considered if the brain injury is stable and the benefit is considered to outweigh the risk of increased intracranial haemorrhage. However, BTF states that evidence is lacking to support recommendations regarding the timing of pharmacologic chemoprophylaxis.[5]

The Parkland Model[6,7] has an algorithm which categorises TBI patterns as low-risk, moderate-risk, or high-risk for spontaneous expansion, and tailors VTE prophylaxis to each type (Figure). This seems a very reasonable strategy. However, the model is not fully applicable in our setting. We do not have facility for interventional radiology and application of Inferior Vena Cava (IVC) filter for high-risk patients. It would be impractical to refer all high-risk patients to other centres for consideration of a filter.

We recommend mechanical prophylaxis in all TBI patients and early mobilisation where applicable. We propose that all TBI patients shall best ratified into low, medium and high risks. We recommend the initiation of enoxaparin at 24 hours and 72 hours post-injury in mild and moderate TBIs, respectively, as per the Parkland Model.[6,7] With regards to high risk TBI group, we recommend a repeat computed tomography (CT) scan of the brain at day 5 along with a Doppler scan of deep leg veins. If CT brain at day 5 is stable, and Doppler scan is negative for the presence of DVT, we recommend the initiation of enoxaparin. If the CT brain is not stable and/or there is presence of DVT, we recommend referral for consideration of IVC filter.

The retrospective nature is a limitation of the current study in addition to its small TBI population. While none of our patients suffered VTE despite low use of chemoprophylaxis even in immobile patients with moderate to severe head injury, this shall not be allowed to give us false reassurance. We should rely on the best available evidence to prevent a VTE occurrence which can be potentially fatal. A re-audit in this regard was planned after 3-6 months to confirm compliance with the new guidelines.

Conclusion

The usage of VTE prophylaxis was found to be low in

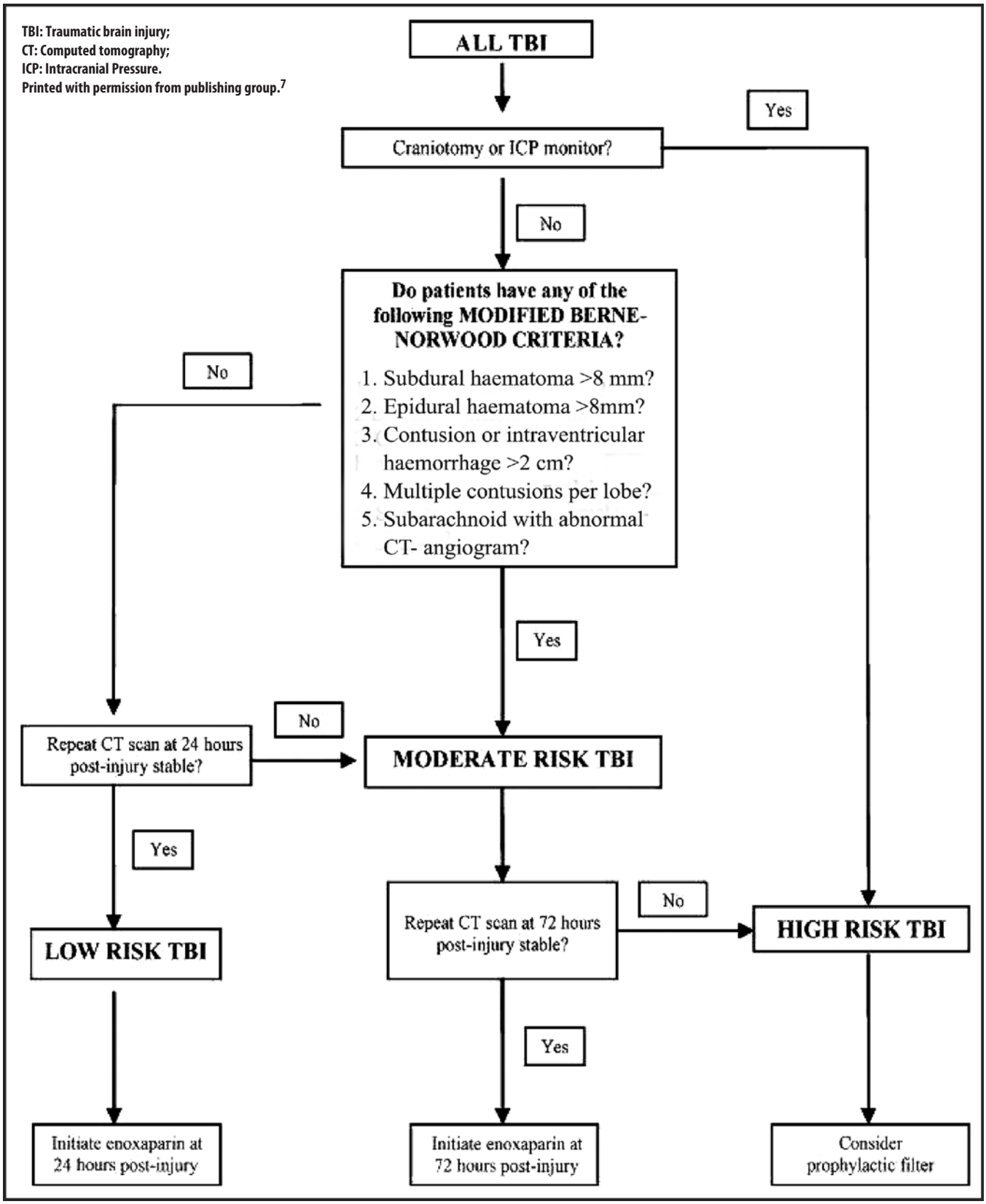

Figure: Parkland Model.

clinical practice. A modified Parkland Model approach seemed the most appropriate to avoid VTE-related events.

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