Regional Anaesthesia in Patients Receiving Anti-Thrombotic Therapy

Essay

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التخدير الجزئي في المرضى الخاضعين للعلاج بمضادات التخثر

رسالة توطئة للحصول على درجة الماجستير في التخدير

مقدمه من الطبيب

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LIST OF ABBREVIATIONS

µg	Microgram
ACLS	Advanced Cardiovascular Life Support
ACS	Acute Coronary Syndrome
ACT	Activated Clotting Time
ADP	Adenosine Di-Phosphate
aPTT	Activated Partial Thromboplastin Time
ASA	Acetyl Salicylic Acid
ASRA	American Society of Regional Anesthesia and pain medicine
AT	Antithrombin
ATP	Adenosine Tri-Phosphate
b.i.d (or BID)	(‘’bis in die’’ in Latin) twice a day
BCLS	Basic Cardiac Life Support
BMS	Bare Metal Stent
C	Cervical vertebra
Ca^{+2}	Calcium ion
CABG	Coronary Artery Bypass Grafting
cAMP	Cyclic Adenosine Mono-Phosphate
cGMP	Cyclic Guanosine Mono-Phosphate
CN	Cranial Nerve
CNS	Central Nervous System
COX	Cyclo-Oxygenase enzyme
CSE	Combined Spinal Epidural
CSF	Cerebro-Spinal Fluid
CT	Computed Tomography
CVS	Cardiovascular System
CYP	Cytochrome enzymes
d	Day(s)
DAPT	Dual Antiplatelet Therapy
DCR	Dacryo-Cysto-Rhinostomy
DES	Drug Eluting Stent
DNA	Deoxyribonucleic Acid

DTIs	Direct Thrombin Inhibitors
DVT	Deep Vein Thrombosis
ECT	Ecarin Clotting Time
ESRA	European Society of Regional Anaesthesia and pain therapy
F	Factor
FFP	Fresh Frozen Plasma
Fig	Figure
FSF	Fibrin Stabilizing Factor
g	Gram(s)
GI	Gastro-Intestinal
Gla	Gamma-carboxyglutamic Acid-rich
GP IIb/IIIa	Glycoprotein IIb/IIIa
h	Hour(s)
HIT	Heparin-Induced Thrombocytopenia
HMWK	High Molecular Weight Kininogen
Hz	Hertz
i.v. (IV)	Intravenous
ICU	Intensive Care Unit
IgG	Immunoglobulin G
INR	International Normalized Ratio
IU	International Unit
Kg	Kilogram(s)
L	Lumbar vertebra
LA	Local (Anaesthetic or Anaesthesia)
LMWH	Low Molecular Weight Heparin
MHz	Megahertz
min	Minute(s)
ml	Milliliters
mm Hg	Millimeter of Mercury
MRI	Magnetic Resonance Imaging
n.	Nerve
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
PCC	Prothrombin Complex Concentrates

PDEs	Phosphodiesterases
PG	Prostaglandin
pH	Power of Hydrogen
PK	Prekallikrein
PL	Phospholipid
PNB	Peripheral Nerve Block
PT	Prothrombin Time
PTA	Plasma Thromboplastin Antecedent
PTC	Plasma Thromboplastin Component
PVBs	Paravertebral Nerve Blocks
RA	Regional Anaesthesia
rFVIIa	Recombinant Activated Factor VII
S	Sacral vertebra
s.c. (SC)	Subcutaneous
SAB	Sub-Arachnoid Block
SPCA	Serum Prothrombin Conversion Accelerator
T	Thoracic vertebra
t1/2	Half-life
TAP	Transversus Abdominis Plane
TEG	Thromboelastograph
TF	Tissue Factor
TP	Thromboxane and Prostaglandin
t-PA	Tissue Plasminogen Activator
TT	Thrombin Time
TXA_2	Thromboxane A_2
U	Units
UFH	Unfractionated Heparin
u-PA	Urokinase Plasminogen Activator
Vit	Vitamin
VKA	Vitamine K Antagonist
VTE	Venous Thromboembolism
vWF	Von Willebrand Factor

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INTRODUCTION

Anti-thrombotics are agents used to reduce the formation of blood clots and to prevent venous thromboembolism (VTE). The combination of regional anaesthesia and thromboprophylaxis is mandatory in many operative procedures; **(*Horlocker et al, 2010).***

Anti-thrombotic drugs can be classified into fibrinolytic agents as (Streptokinase), anticoagulants that are divided into parenteral anticoagulants as (Heparine and Fondaparinux) and oral anticoagulants as (Warfarin, Dabigatran and Rivaroxaban) and Anti-platelet medications including (non-steroidal anti-inflammatory drugs [NSAIDs], thienopyridines and glycoprotein IIb/IIIa inhibitors), ***(Benzon et al, 2013).***

Indications for perioperative anti-thrombotic therapy differs with the type of surgery as in elective surgeries these drugs may be used in prevention of stroke in atrial fibrillation, prevention of venous thrombosis after total joint surgery or hip fracture, surgery in mobile patients who have medical history of previously DVT formation, most gynecologic or urologic surgery patients as well as cardiac surgery like CABG and valve replacement. It can be faced in emergent surgeries like patients with established medical condition like acute VTE, acute coronary syndromes or stroke, and patients undergoing emergent surgery that needs

thromboprophylactic agents as most open heart surgeries and vascular surgeries, **(*Benzon et al, 2013).***

The decision of regional anaesthesia always requires a careful risk–benefit analysis. The perioperative cessation of anti-thrombotic drugs to improve the safety of regional block needs to be critically evaluated. An alternative anaesthetic technique should be used if it is judged that the administration of the anti-thrombotics must not be interrupted. Each group of these drugs has its anaesthetic recommendations and management. Guidelines were described by many societies like the American Society of Regional Anesthesia and pain medicine (ASRA) and European Society of Regional Anaesthesia and pain therapy (ESRA) to decrease the complications of regional anaesthesia in those taking thrombolytics, anticoagulants and antiplatelets, **(*Gogarten et al, 2010).***

There are many side effects of these drugs as allergy, peptic ulcers with NSAIDs, acute renal injury and increased incidence of bleeding as (GI bleeding, perioperative bleeding and intracranial haemorrhage). There are also complications that are related to the regional anaesthesia as infections, local anaesthetic toxicity, vascular injury, nerve injury and headache related to dural puncture. The vascular injury during regional anaesthesia in patients with anti-thrombotic therapy is the main and major

complication that causes haematoma at the site of injury compressing important organs and structures. Spinal haematoma occurs in the epidural space because of the prominent venous plexus may tamponade the spinal cord and affect its perfusion pressure, **(*Scottish Intercollegiate Guidelines Network (SIGN), (2012).***

AIM OF WORK

This essay aims to focus on the challenges facing anaesthesiologists during using regional anaesthesia in patients on anti-thrombotic therapy.

CHAPTER A

ANATOMY OF THE VERTEBRAL COLUMN AND THE SPINAL CORD

ANATOMY OF THE VERTEBRAL COLUMN AND THE SPINAL CORD

Anatomy holds a central position in regional anaesthesia because of the obvious necessity of correctly delivering the therapeutic solution to the target neural structures. Therefore knowledge of anatomy and landmarks of the vertebral column and the spinal cord are essential to the safe administration of the neuraxial blockade, ***(Moos, 2002).***

The adult spine has a natural S-shaped curve *(Fig. 1)*. It is composed of 7 cervical (C), 12 thoracic (T), 5 lumbar (L) vertebrae, 5 sacral (S) vertebrae, and there are small rudimentary coccygeal vertebrae *(Fig. 1)*. Vertebrae differ in shape and size at the various levels, but most vertebrae have similar features, ***(Hines, 2016).***