CME ARTICLE

Development of ultrasound guided regional anaesthesia in the emergency department, Hospital Kuala Lumpur

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SUMMARY

Ultrasound guided regional anaesthesia is a fast-rising acute pain management modality in emergency departments worldwide. It is a safe and effective alternative to opioid based systemic analgesia. Establishing a standardised and efficient protocol requires a multidisciplinary approach namely involving collaborations between anaesthesiology and emergency medicine counterparts. In this article, we outline our approach in establishing an end-to-end service which is both patient-centred and sustainable.

KEYWORDS:
Ultrasound guided, regional anaesthesia, pain management

INTRODUCTION

Pain management is a part and parcel of every emergency physician's repertoire. Daily treatment of a variety of pain often includes opioids as a pharmacological agent of choice. Even so, several studies revealed that pain management in the emergency setting are often inadequate and delayed.[1]

Ultrasound guided regional anaesthesia (UGRA) is a well-established modality of pain management. In keeping with the nationwide mission for a 'Pain Free Hospital', peripheral nerve block is a safe and reliable alternative. However, most emergency departments have yet to culminate UGRA in their daily practices.[2]

Establishing a Team

UGRA at the emergency department, Hospital Kuala Lumpur was introduced in October 2019. A core team was formed encompassing emergency physicians and medical officers with basic ultrasound proficiency. A total of three emergency physicians and nine medical officers were recruited. Our mission was to provide an alternate modality for pain management. Efforts were made in collaboration with anaesthesiology department, specifically with trained regionalist. According to Stone et. al.[3] a dynamic multidisciplinary teamwork is needed on both local and national scales to avoid delays in the development and implementation of patient-centred, safe procedural care and allow patients the benefits of regional anaesthesia.

Clear objectives of the implementation were first outlined. The primary goal was to provide UGRA as an alternate modality for pain relief, focusing particularly on trauma cases. The aim was to increase pain management effectiveness and reduce the usage of opioid analgesia. Ensuring safety, reliable and efficient UGRA techniques were provided, and an appropriate management pathway was created for post procedural follow up and multidisciplinary collaborations.

Our first order of business was to train the core team members. Our team attended UGRA workshops organised by the anaesthesiology department. It was a two-part training with lectures focusing on introduction to regional anaesthesia, anatomy, sonoanatomy, clinical applications and techniques to perform basic UGRA of the upper limbs, lower limbs and truncal. Part 2 was a hands-on workshop with demonstrations and application of these skills. Upon completion of the training, all members were sent in turn to the operation theatre for a 2-week attachment with our anaesthesiology colleagues. The mainstay of training included nerve visualisation, needle visualisation, ergonomic setting arrangement, anaesthesia agents (dosage and dilution), nerve injury prevention and monitoring. Focus was also placed on managing procedural and drug related complications. This hands-on experience was profound in witnessing and understanding the practical approaches to UGRA and gaining real life experience in performing different types of blocks.

On returning to the emergency department, the team started performing blocks, focusing on trauma patients. All blocks were initially done under supervision of the anaesthesiologist. The overview for all procedures incorporated several crucial elements.

1. Patient selection
2. Consent
3. Preparation
4. Procedure execution
5. Evaluation
6. Monitoring
7. Documentation
8. Database entry and update
9. Follow up

System

The common indications were acute pain management of the extremity, anaesthesia of the extremity for procedures, alternative to procedural sedation and alternative to narcotics in certain patient population (i.e., patients with concomitant mental status change).

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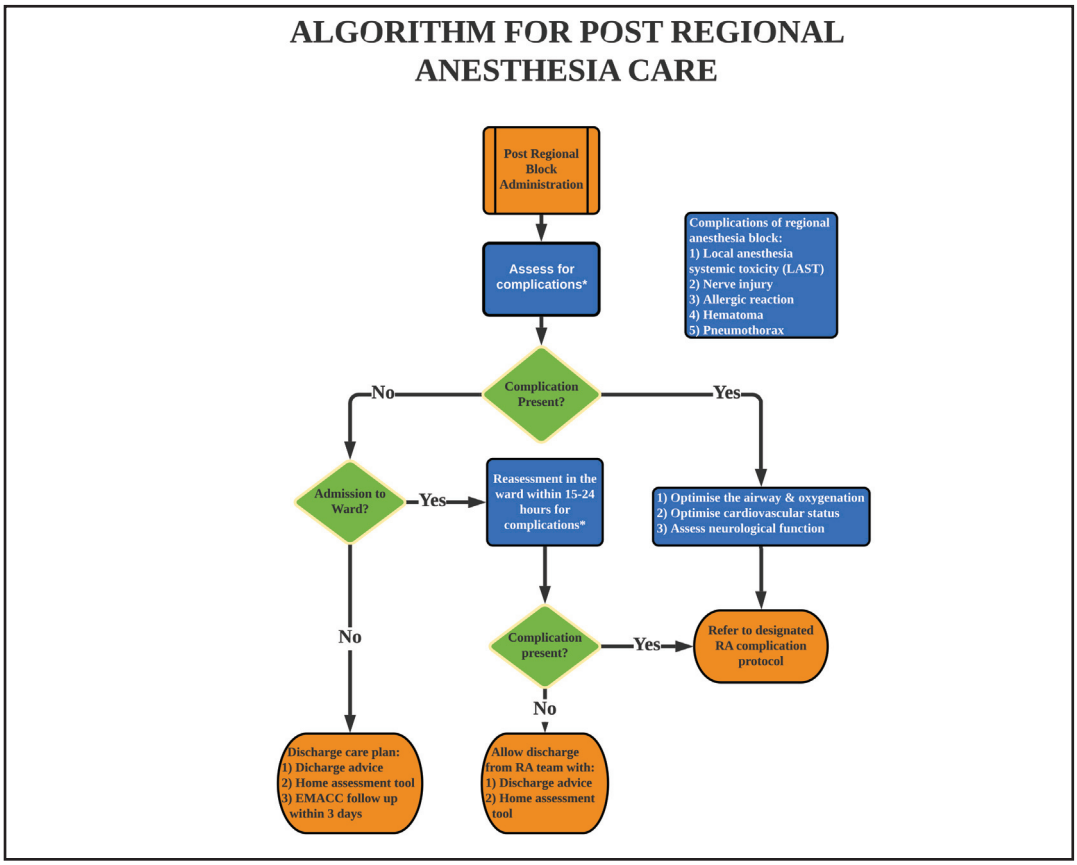

Fig. 1: Algorithm for post regional anaesthesia care.

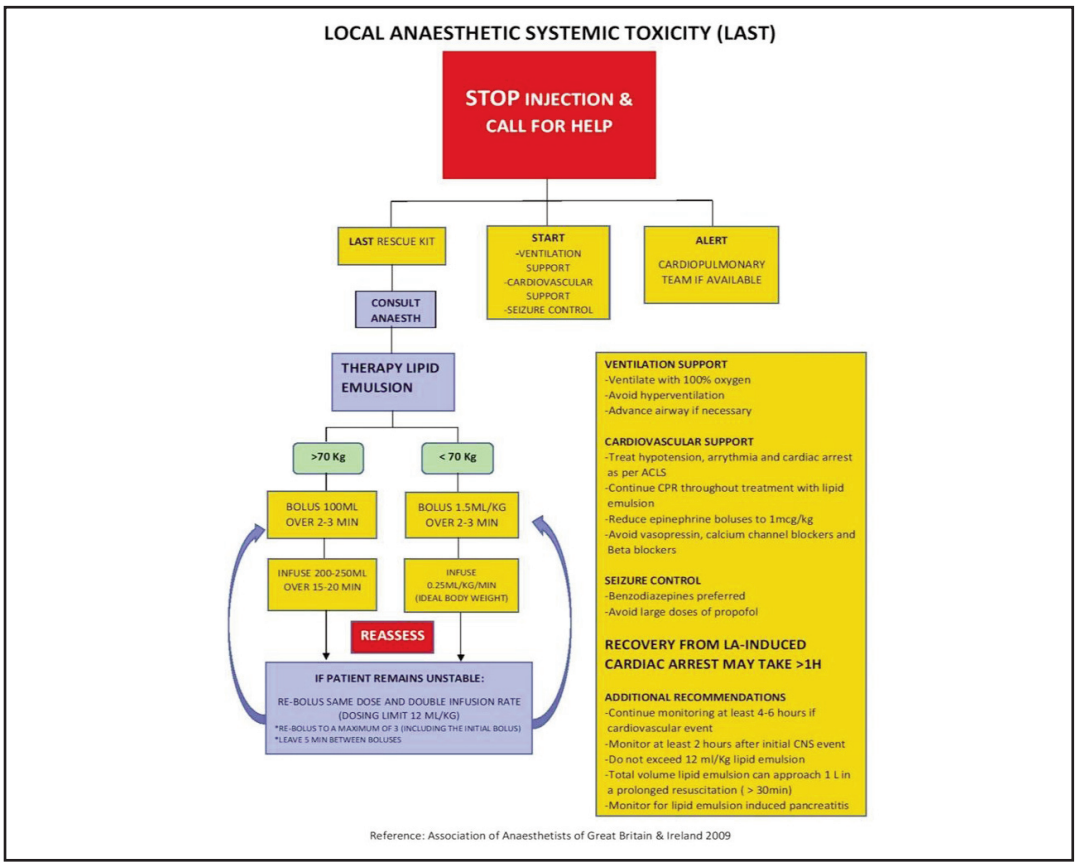

Fig. 2: Local anaesthetics systemic toxicity pathway (LAST).

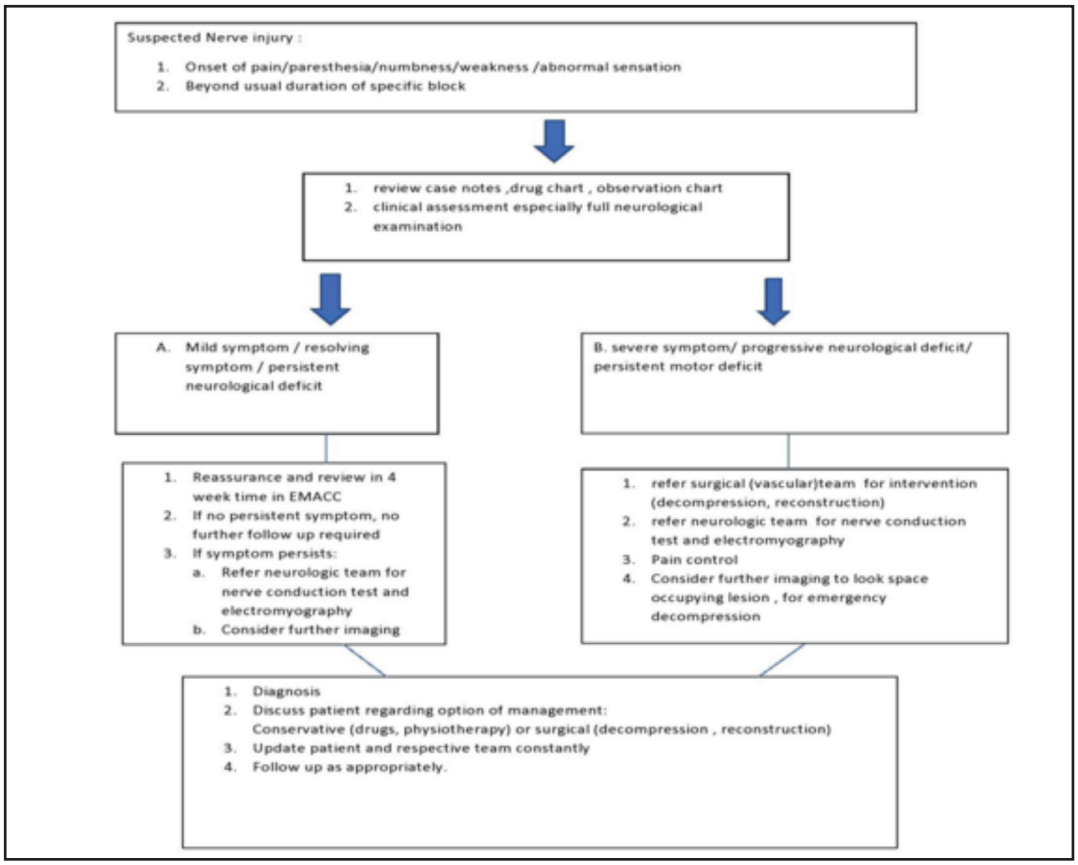

Fig. 3: Nerve injury pathway.

Thus far, these are the common blocks performed:

- Upper limb blocks (44%): supraclavicular, infraclavicular, axillary, interscalene and mid forearm.
- Lower limb blocks (43.2%): femoral, popliteal, fascia iliaca
- Truncal (12.8%): erector spinae plane blocks (ESP), pectoralis and serratus plane nerve blocks (PECS)

Patients with contraindications, such as a history of allergic reaction to local anaesthesia agents, active infection at the injection site, injuries and risk of compartment syndrome, preexisting neurological deficit, extreme obesity obscuring optimal ultrasonographic visualisation and patients on anticoagulant therapy (relative contraindication) were excluded.

We created a customised form with patient and block details and the information was uploaded to the online database. After completion of the blocks the patients were observed for up to 1 hours in the clinical bay. Longer observation periods were imposed on patients with respiratory compromise that underwent brachial plexus blocks. An algorithm for post regional anaesthesia was curated to ensure safe and standardised care. All patients either admitted or discharged were followed up within the next 24 hours for any complications and the general level of pain control was elicited. Follow up is done via teleconference or visits to the respective wards by the team member on duty for the day.

Assessment of pain score pre- and post-procedure overall shows 95% reduction from severe and moderate pain to mild pain, where else the remaining 5% from severe to moderate pain.

Most patient expressed satisfaction post-procedure but a further objective assessment on the satisfaction scale is required.

Structure

To enable a more conducive work environment, we converted a room adjacent to the clinical bay to the regional anaesthesia suite. Here we stored our equipment and database. This area also doubled as our follow up zone as needed.

A tool kit was created encompassing blocking agents and needles to allow us to perform bedside blocks in varies zones. In case the patient cannot be transferred to the regional anaesthesia suite, we performed these blocks in the respective zones instead. This enabled coverage to all zones in the emergency department.

Quality Assurance

All the members underwent predetermined credentialing and privileging prior to performing blocks independently. This was divided into three levels of difficulty. Level 1 incorporated supraclavicular, mid forearm, femoral, popliteal and fascia iliaca block. Level 2 included interscalene, erector spinae

plane (ESP) and PECS block. Finally, Level 3 integrated infraclavicular and axillary blocks. An online logbook was created, and all members were required to comply. For each of this component, observation and assistance of at least five blocks are required, subsequently five blocks are performed under supervision and another five blocks are performed without any supervision and with no complication inquired. Upon completion of the prerequisites, independent performance of the blocks is allowed.

Establishment of regional anaesthesia has sparked a great deal of interest among our peers. We have biannual workshops and annual symposiums for continuous education and targeting recruitment of new members in the emergency fraternity.

Instituting ongoing continuing medical education (CME) and varies training platforms ensures level of competence is maintained among the emergency department staff. It also serves to develop and increase the knowledge and skill among all core team members.

Tackling Complications

All procedures have a risk of complications. Specialised pathways were developed in tackling possible complications such as nerve injury and local anaesthesia toxicity (LAST). LAST rescue kit containing intralipid 20% is kept in the general operating theatre. In a situation whereby it is needed, our anaesthesiology counterparts are consulted and timely administration of the antidote is possible. This is to ensure in the case of any undue outcome, a standardised protocol is in place for the best course of action.

DISCUSSION

Ultrasound guided regional anaesthesia (UGRA) is a promising modality of pain management in the emergency department. Despite its well-established benefits, relatively few emergency departments in Malaysia has fully embraced UGRA in their day-to-day practice. Since bringing UGRA to our emergency department, we find that the vast majority of physicians have embraced this new skill set. All procedures were initially performed under the supervision of the anaesthesiologist in the emergency department, and after the completion of credentialing and privileging, we started performing these procedures independently.

Successful collaboration with our anaesthesiology counterparts has provided a fruitful avenue for continuous education and the development and implementation of patient centred, safe procedural care that allows more patients the access to the benefits of UGRA.[3]

In our experience, bringing UGRA to the emergency department was successful with a well-structured and systematic approach, in collaboration with the anaesthesiology counterparts. Implementation of patient selection criteria, credentialing and privileging, follow up checklist, complication pathways and an online database to monitor our daily procedures, enables a safe, reliable and efficient patient-centred care. One study concluded that despite the many advantages of UGRA such as avoiding the risks of procedural sedation and reduction in the use of opioid analgesia, many emergency medicine trainees do not receive focused education in UGRA, this includes the lack of published curriculum specifically for emergency medicine physicians.[4] In the future, incorporating UGRA in EM training and providing formal certification will empower more emergency physician to confidently and competently include regional anaesthesia in their toolkits.[5]

Ultrasound is readily available in most emergency departments nationwide. Additional training, protocols and increased support from nursing staff are modifiable factors that could facilitate uptake.6 The practical reality is that UGRA is a multimodal analgesia versus a stand-alone ultrasound technique.[2] It is important to have regular hands - on training sessions to ensure we harness our skill set and continuous learning prevails. It will take a collective effort to overcome these barriers before this practice becomes widely adopted in emergency departments across the nation.[7]

Embracing UGRA as part and parcel of pain management in the emergency medicine faculty, adequate training, interdepartmental collaborations and a structured system and protocol is the way forward in providing a pain free experience for our patients.

CONCLUSION

Ultrasound guided regional anaesthesia can be utilised as an integral modality in pain management. A standard protocol clearly highlighting end-to-end care will ensure a safe, patient centred service that can be provided in all emergency departments nationwide.

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