

“CORONA” Approach to Procedure-specific Regional Anesthesia Techniques

(Running Head: “CORONA” Approach of Regional Anesthesia)

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Abstract

The curious and relevant observations have the potential to affect decision-making capacity. Performance and planning of successful regional anesthesia (RA) techniques require a thorough understanding of all important surgical steps involved, relevant anatomy, and involved pain-generating structures before and after surgery with their innervations. Any surgical procedure involves removing affected structures like dead tissues, inflamed tissues, injured tissues and correcting existing pathology like injury or fractured bone. Due to this, components causing postoperative pain are entirely different, and innervations of such components should be the main target of the RA protocol in providing postoperative pain relief. “CORONA” approach describes various steps of observations during ongoing surgical procedure and relevance of each step in decision-making ability to execute procedure-specific RA technique.

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Observing something makes a big difference directly or indirectly, affecting decision-making capacity. A curious observation is the first step in the decision-making process [1]. It involves two processes: curiosity (desire to know or learn something) and observation (noticing important details to gather information). Various processes leading towards appropriate decisions include questioning, inquiring, experimenting, visualizing, skepticizing, evaluating, identifying different patterns, imaginative thinking, logical reasoning, predicting, and inferencing [1]. The improvement in the decision-making abilities is due to the dissatisfaction caused by curiosity. Thus, the curious observation not only helps in decision-making but also improves skills and abilities. The relevant observation includes observing something closely connected or

appropriate to what is being done or considered, which finally affects decision-making abilities. This article describes the importance of Curious Observation (CO) and Relevant Observation (RO), leading to Novel Approaches (NA) to procedure-specific regional anesthesia (RA) techniques. This novel “CORONA” approach (Table 1) will help anesthesiologists plan and execute the RA technique for any particular surgery, either for anesthesia or analgesia purposes.

The structures, innervations, and mechanisms responsible for pain generation before and after surgery are different [2, 3]. Thus, it is important to understand the location and relevant anatomy of various pain-generating components before, during, and after surgery. The transmission of the nociception arising from the pain-generating structures to the brain is through their rich innervations. In contrast, the structures without any innervation may not contribute much to pain generation. The process of pain generation involves stimulating free nerve endings and nociceptors scattered throughout the affected structure due to direct irritation, inflammation, and chemical mediators.

Nociception arising from the diseased or affected structures due to pathology or injury mainly contributes to the pain before surgery. However, after the surgery, such affected structures like dead tissues, inflamed tissues, injured tissues, or fractured bone are removed/corrected during the surgical procedure. So, the contribution of these structures to postoperative pain generation becomes negligible. The postoperative pain generation is mainly due to the freshly inflamed structures (which are healthy before surgery) involved in surgical dissection. The innervations of the surgical dissection area should be the main target of the RA protocol in providing postoperative pain relief.

For example, in knee joint intraarticular pathologies like osteoarthritis or injuries like ligament injury, the intraarticular pain-generating components dominate extraarticular components in causing preoperative knee pain due to associated inflammation within the joint. However, after the total knee arthroplasty (TKA) surgery (for osteoarthritis), most of the intraarticular pain-generating components are removed and replaced with

nonneural and nonvascular implants [3, 4]. So, the extraarticular pain-generating components dominate intraarticular components in causing postoperative knee pain due to inflammation associated with the surgical dissection. In contrast, arthroscopic knee surgery for ligament injury involves all the surgical dissection inside the joint, retaining all pain-generating components after the surgery. So, the intraarticular pain-generating components dominate post-arthroscopic knee surgery due to relatively less inflammation involved in the extraarticular surgical dissection. Thus, the procedure-specific RA technique for knee surgery should predominantly involve innervations of the extraarticular pain-generating components (surgical dissection area) for TKA surgeries and the intraarticular pain-generating components (surgical dissection area) for arthroscopic knee surgeries. The decision-making of such procedure-specific and target-specific RA techniques depends on the curious and relevant observations during the ongoing surgery.

"CORONA Approach" and Its Implications		
C	CUT: <ul style="list-style-type: none"> Structures getting cut during surgeries starting from the skin, subcutaneous tissues, fascias, superficial and deep structures 	<ul style="list-style-type: none"> Surgical skin incision represents the dermatomal innervation of that particular area requiring sensory (analgesic) or field block.
O	OBSERVE: <ul style="list-style-type: none"> Observing the surgical field during surgery 	<ul style="list-style-type: none"> Vital structures like vessels or nerves lying in the surgical field can be an important landmark to identify the structures of interest or to avoid injury to those structures while administering the regional anesthesia technique
R	RETRACT/REMOVE: <ul style="list-style-type: none"> Retraction of muscular tissues and fascias Removal of affected or dead tissues 	<ul style="list-style-type: none"> Retraction of muscles required adequate motor-blockade of the involved myotomal innervations Innervations of the removed tissues may not play any role in postsurgical pain
O	OBSERVE: <ul style="list-style-type: none"> Observing retained components after surgery 	<ul style="list-style-type: none"> All the retained structures after the surgery are the major contributors to postsurgical pain
N	NERVE SUPPLY: <ul style="list-style-type: none"> Nerve supply of all retained pain generators 	<ul style="list-style-type: none"> Innervations of all retained structures along with the surgical dissection area should be the target for any RA technique to provide complete analgesia
A	ASSESS AND ADMINISTER: <ul style="list-style-type: none"> Assess neurological components before and after the surgery Administer proposed and planned regional anesthesia technique, based on all above components 	<ul style="list-style-type: none"> Presurgical (due to injury or pathology) or postsurgical damage of any neurological component can be ruled out and properly documented before administering the planned RA technique

Table 1: Components of the "CORONA" approach of regional anesthesia.

In order to provide complete and effective analgesia, all the innervations of the pain-generating structures involved in the surgical steps (starting from the incision to the deeper dissection) should be included in the proposed or planned procedure-specific block. For that, the curious and relevant observations of removed and retained pain-generating structures during each surgical step and associated vital structures like vessels or nerves in the surgical field play an

essential role in the decision-making process of selecting a target-specific RA technique.

To conclude, for the procedure-specific RA technique, knowledge of the surgical procedure is essential. Observations of many such procedures help anesthesiologists fine-tune the RA technique and determine the spared areas that need to be supplemented with the primary RA technique. We believe that this

"CORONA" approach will help all aspiring regional anesthetists to assess, plan, and administer procedure-specific RA techniques.

Contributor ship Statement

Dr. Kartik Sonawane¹, Dr. Hrudini Dixit², Dr.J. Balavenkatasubramanian³

K.S.: Designed manuscript content and components of corona approach. Took the lead in manuscript writing and designed required table contents.

H.D.: Proofread and co-wrote the manuscript.

J.B.: Approved idea by KS and provided scientific guidance for manuscript writing. Provided guidance for the content of the manuscript and Co-wrote the paper. Approved final version of the manuscript.

All authors provided critical feedback and helped shape the manuscript.

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