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Spinal anaesthesia of the upper limb; the update and the future

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Mohamed Amr Ebeid

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List of Abbreviations

AIS	**:**	Axon Initial Segment
BP	**:**	Brachial Plexus
CNS	**:**	Central nervous system
CPNB	**:**	Continuous peripheral nerve block
CVS	**:**	Cardiovascular system
DVT	**:**	Deep venous thrombosis
EPSP	**:**	Excitatory postsynaptic potential
GA	**:**	General anaesthesia
GABA	**:**	Gamma-Aminobutyric acid (γ-Aminobutyric acid)
IS	**:**	Initial Segment
LA	**:**	Local anaesthetic
LAST	**:**	Local anaesthetic systemic toxicity
LD	**:**	Longest distance
MODS	**:**	Multiorgan damage syndrome
nAchRs	**:**	Nicotinic acetylcholine receptors
PABA	**:**	Para-aminobenzoic acid
PACU	**:**	Postanaesthetic care unit
PONV	**:**	postoperative nausea and vomiting
RA	**:**	Regional Anaesthesia
RB	**:**	Regional Block
SD	**:**	Shortest distance

SD	**:**	Somato-Dendritic
SDSU	**:**	Same-day surgery unit
SIRS	**:**	Systemic inflammatory response syndrome
TTX	**:**	Tetrodotoxin
USG	**:**	Ultrasound guided

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Introduction

In 1908 August Bier, Professor of surgery at Berlin, described an unusual method of producing analgesia of a limb. He exsanguinated the arm or leg by means of a tourniquet, and injected a local anaesthetic solution into a vein. The recent resurgence of interest in this technique, culminating in this Symposium, is not only evidence of its usefulness even today, but also reflects the paucity of our knowledge of the exact mechanism of the production of anaesthesia in this method. However, in 1908 the principle was truly revolutionary, and we have good reason to be thankful that "Bier was always an innovator" ***(Holmes, 1969).***

There has been an increase in the number of surgical procedures done in the ambulatory environment. Single-injection and infusion systems utilizing portable, disposable elastomeric pumps help provide safe pain control in this environment ***(Bowens & Sripada, 2012).***

At the present time, the management of postoperative pain is the major indication for continuous brachial plexus (CPB) blockade. The development of sophisticate surgical techniques for microvascular and reattachment surgery of the upper extremity has increased the demand for continuous techniques. Good peripheral blood flow in the transplant during the operation and in the postoperative period is important. The use of continuous techniques is particularly warranted during the postoperative period to provide analgesia, sympathetic blockade, and increased blood flow to the injured extremity ***(Kurt et al., 2005).***

Regional anesthesia of the upper extremity has several clinical applications and is reported to have several advantages over general anesthesia for orthopaedic surgery. These advantages, such as improved postoperative pain, decreased postoperative opioid administration, and reduced recovery time, have led to widespread acceptance of a variety of regional nerve block ***(Bruce et al., 2012).***

Health economic comparisons relevant to this scenario are few and they provide inconsistent results. Nordin and colleagues found regional anaesthesia and general anaesthesia to be equally expensive for inguinal hernia surgery. On the contrary, Gonano and colleagues demonstrated ultrasound-guided interscalene block to be significantly more cost-effective than general anaesthesia for arthroscopic shoulder surgery ***(Gupta & Hopkins, 2012).***

The post-anaesthesia care unit (PACU) is an expensive and labor-intensive environment. The evidence of benefit from regional anaesthesia in decreasing PACU length of stay (LOS) or bypassing it completely in the ambulatory setting is well demonstrated. Patients receiving regional anaesthesia for rotator cuff surgery versus general anaesthesia were shown to bypass the PACU more often, report less pain, ambulate earlier, meet discharge criteria sooner, and be more satisfied with their care ***(Corey et al., 2014).***