METHODS

This systemic review comparing the complication rates among various techniques of brachial plexus block was performed according to recommendations from the Preferred Reporting Items for Systemic Reviews and Meta-Analyses statements.[5]

Methodology for Literature Search

This systematic literature review was synthesized by searching databases such as PUBMED, EMBASE, Google Scholar, and Cochrane Library from 2001 till the year 2020. The keywords "Brachial plexus block", "complications", "brachial plexus injury, brachial plexus neuropathies", "axillary block", "supraclavicular", "infraclavicular", "ultrasonic-guided", "nerve block" were used to retrieve the related studies. The above-mentioned databases are readily available for the literature search.

Eligibility Criteria

Inclusion Criteria

The databases were searched for published randomized controlled trials (RCTs) and cross-over trials comparing different techniques or approaches of brachial plexus anesthesia. The RCTs involving modification of these techniques such as the use of any drug to alter the local anesthetic duration, the use of ultrasound or nerve stimulator along with block were also included.The clinical evidence was searched in the form of original peer-reviewed journal articles published in the English language. Clinical and experimental studies were included and the references of the reviewed articles were also searched for the relevant studies wherever necessary to increase the yield.

Exclusion Criteria

Conference papers, book reviews, book chapters, case reports, case series, cross-sectional, case-control, cohort, retrospective study designs, animal studies, cadaver studies, letters to editors, commentaries, newspaper and newsletter articles, expert opinions, and theses or dissertations were not used. Articles that are not published in English were excluded. Studies were also excluded based on their methodological quality assessment.

Types of Participants

Participants older than 18 years of age and undergoing surgery of the upper limb with any of the techniques of BPB and demonstrating the complications as their primary or secondary outcome were included.

Types of Intervention

We have included those RCTs in which the different techniques (either two or three) of BPB were compared to each other. The RCTs that have focused on only one of the techniques of BPB and compared the various intervention within one technique were also included.

Various intervention includes:

- Comparison of two or three techniques of BPB (ISBPB, SBPB, IBPB, AXB, and RBPB)
- Comparison of peripheral nerve stimulator guided or ultrasound-guided BPB
- Comparison of different local anesthesia (LA) in BPB (lignocaine, bupivacaine, ropivacaine, and chloroprocaine)
- Comparison of different volumes of LA in BPB
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- Comparison of addition of some drugs like dexamethasone to LA in BPB
- Comparison of perineural and perivascular LA in BPB
- Comparison of single-shot injection and multiple injections of LA
- Comparison of single injection with continuous catheter.

Data Extraction and Management

Data were independently extracted from the included studies by one author using uniform data extraction and any discrepancies were resolved by discussion. Extracted data were independently entered into an Excel spreadsheet.

Data items extracted

The following information was extracted from each trial:

- The first author of the study, year of publication, number of enrolled patients, American Society for Anesthesiology (ASA) status, clinical setting, duration of follow-up
- Type of LA regimen (lignocaine, bupivacaine, ropivacaine, and chloroprocaine), technique of LA injection (single injection, multiple injection), LA volume and concentration used
- The technique used in the study (ISBPB, IBPB, RBPB, SBPB, and AXB) and the technique of block needle insertion (ultrasound-guided, in-plane, out-of-plane)
- Complications of the techniques, complications related to LA toxicity, and success/failure rate of the study.

Outcome Definitions

Primary outcome measures

The pre-specified primary outcome was the rates of complications (paresthesia/pain, dyspnea, PNP, Horner syndrome, vascular puncture, pneumothorax, and many more) associated with each of the techniques of the BPB.

Secondary outcome measures

ASA status of patients in various RCTs, successful/failed blocks, onset time, duration of anesthesia, and duration of sensory and motor blocks

Statistical Analysis

The articles were stratified based on the type of technique chosen in the study and their related complications. The data obtained was entered in the Microsoft Excel spreadsheet. Characteristics of the retained studies sorted by the first author name and year of publication were presented in a tabular form. These tables will have information relating to the clinical setting of the study, number of patients, duration of follow-up of the study, LA regimen, onset and duration of LA, success/failure rates, techniques used, and the various complications and adverse effects associated with different techniques and LA toxicity respectively.