Iatrogenic nerve injuries during surgeries of the neck: a systematic review

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Introduction

Iatrogenic nerve injuries in the neck can present with a broad spectrum of symptoms ranging from mild pain, numbness, or weakness, to devastating consequences such as permanent irreversible damage, disability, or even death to patients. Surgical interventions in the neck region, especially those requiring radical dissections in the neck carry a significant risk of iatrogenic injury to several vital nerves traversing through the neck such as Vagus, phrenic, brachial plexus, cervical plexus, ansa cervicalis, and spinal cervical nerves. This study aims to apply evidence-based principles to understand iatrogenic nerve injuries through evidence synthesis using systematic review to generate weighted pooled results on clinically significant anatomy during surgical procedures in the neck. Although the literature contains many studies that cast light on what nerve/plexuses are frequently injured, there is no study combining all those vast amounts of data and presenting it to surgeons in an easy-to-read clean-cut comparative approach using a systematic review to fill the gap.

Aims and Objectives

The main aim of this study is to review the significant correlation between the following surgical procedures in the neck; thyroidectomy, anterior cervical discectomy & fusion of ACDF, laryngectomy, laminectomy, retro or parapharyngeal abscess, sebaceous cyst, cervical lymph node dissection, and the incidence rate of iatrogenic injury of different nerves assessed

Methods

A three-step search strategy was utilized in this review. An initial limited search of PUBMED and Embase will be undertaken to identify text words contained in the title and abstract, and the index terms used to describe relevant articles. A second search using all specified keywords, such as iatrogenic; nerve; injury; recurrent laryngeal; superior laryngeal; was then undertaken across all included databases. Thirdly, the reference list of all identified reports and articles was hand-searched for additional studies. The databases to be searched include PubMed, Embase, Cochrane Library, Scopus, Web of Science, Northern Lights Abstracts, Proquest Dissertations & Theses, and Google Scholar.

Inclusion criteria: Types of participants. This review considered studies that include iatrogenic injuries associated with surgical procedures of the neck (thyroidectomy, anterior cervical discectomy, and laryngectomy) and nerves involved in the injury (recurrent laryngeal nerve, superior laryngeal nerve, sympathetic trunk, and vagus nerve).

Types of studies: The qualitative component of the review will consider studies published in English, and studies dated no older than 2010 were considered in this review.

Exclusion criteria: Opinions/communication, Injuries due to radiation, Trauma injuries/RTA's, Nerve block procedures, Endoscopic surgeries, Ultrasound-assisted regional anesthesia, Older of the last ten/prior to 2009, Non-English.

Results

Our findings showed that Lymph node biopsy in the posterior triangle of the neck constitutes the highest risk of iatrogenic nerve injuries in the neck. In thyroidectomy and parathyroidectomy, the most commonly injured nerve is the superior laryngeal nerve. Recurrent laryngeal nerve injury is uncommon, but once occurs, carries the most widely devastating post-operative effect and prompts the earliest possible intervention to lessen these effects.

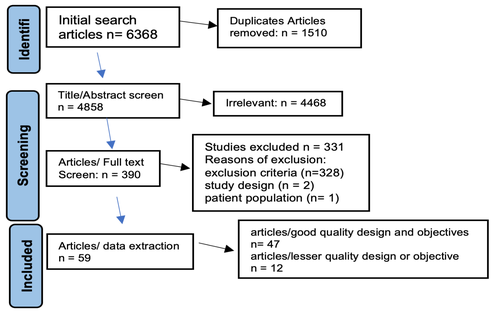

Table 1: Systematic review PRISMA analysis and list of databases searched in this study

Procedure	Most iatrogenically injured nerve
Thyroidectomy and parathyroidectomy	• Recurrent laryngeal nerve: 0.4% to 7.2% for temporary paresis and from 0% to 5.2% for permanent paralysis [1,2,3,4] • Superior laryngeal nerve : As high as 58 % to the external branch of the superior laryngeal nerve (EBSLN). [5,6] • Brachial plexus roots : 0.2 % . [7]
Anterior cervical spine surgery	• Recurrent laryngeal, superior laryngeal and hypoglossal nerve injuries leading to vocal cord paralysis occurs in 0.0711% of cases. Most cases are transient, lasting weeks to months. But paralysis can be permanent in 0.153.5% of cases. [8,9] • Hypoglossal nerve injury during dissection of the anterior triangle of the neck at C2–C4 occurs in up to 8.6% of cases.[10] • Cervical sympathetic chain injury and resultant ipsilateral Horner's syndrome (miosis, ptosis, anhidrosis) is rare (4.2%).[11]
Posterior cervical spine surgery	• The overall incidence of neurological complications to spinal cord and nerve roots has been reported as 0.18%.[12]
Cervical dissection and lymph node biopsy	• Nerve injury is estimated to occur after 3% to 8% of triangle lymph node biopsies. [13, 14] • Estimated prevalence of Suprascapular nerve and Spinal Accessory Nerve injuries following radical neck dissection, modified radical neck dissection and selective neck dissection was 94.8% (95% CI: 88.5-98.9%), 33.0% (95% CI: 19.4-48.3%) and 27.9% (95% CI: 7.1-54.5%), respectively.[15,16]
Cervical laminectomy	• C5 palsy is mostly injured at an overall rate of 5.3% (95% CI 4.6-6.0%). (17) • Posterior cervical surgery (5.8%) • Anterior surgery (5.2%), • The highest prevalence (11.0%) was found in patients who underwent laminectomy and fusion (LIF), while those who received anterior cervical discectomy and fusion (ACDF) had the lowest prevalence (3.3%). • Other intermediate prevalence estimates increased gradually, from cervical laminoplasty-only (CLP-only) (5.1%), to CLP plus other posterior procedures (6.5%) and anterior cervical corpectomy and fusion (ACCF) (7.5%). • C5 palsy was unilateral and transient, and diagnosed within 3 days (3.4%).

Conclusions

•Iatrogenic nerve injuries can occur during neck surgical procedures. Complete familiarity with the anatomy of the region can potentially reduce the risk of a nerve injury.
•The most commonly affected nerves after a lymph node biopsy are the accessory nerve.
•If a nerve is severed during an operation, it should be repaired primarily with an end-to-end coaptation or reconstructed shortly thereafter (early secondary repair).
•If a neurological deficit is noticed immediately after an operation, the patient should be closely monitored with neurological, neurophysiological and neurosonographic methods. If no improvement occurs after 3 months, the injured nerve should be explored. If neurosonography shows a complete separation or neuroma in continuity, an operation should be performed immediately.

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Disclosure

The authors do not have any conflicts of interest to report. References, full search terms, and acronym lists are available upon request.