



Review article

Cervical intradural disc herniation: A systematic review

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ABSTRACT

Background: Cervical intradural disc herniation (CIDH) is rare, and diagnosis and treatment are challenging. We conducted a systematic review and meta-analysis of the literature on the diagnosis and treatment of CIDH.

Method: The presentation, imaging manifestations, diagnosis, management, prognosis and possible pathogenesis were reviewed following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. English-language studies and case reports published from inception to 2017 were retrieved. Data on presentation, imaging characteristics, diagnosis, management, outcomes and pathogenesis were extracted.

Results: Twenty articles involving 23 patients were selected. The most common involved level was C5–6 (43.5%), followed by C6–7 (30.4%), C4–5 (13%), and C3–4 (13%). Spontaneous IDH occurred in 61% of the patients, and relevant cervical trauma was present in 39%. Brown–Sequard's syndrome (56.5%), quadriplegia (34.8%), and radiculopathy (8.7%) were the main presentations. Magnetic resonance imaging (MRI) was the most commonly used diagnostic technique, and the “halo” and “Y-sign” were strong indicators of CIDH. Three (13%) patients were diagnosed as having CIDH preoperatively, and 87% were confirmed intraoperatively. All patients underwent surgical intervention primarily (73.9%) through an anterior approach. Neurological function improved postoperatively in all patients but one. Dural and arachnoid mater tears were managed by direct suture or covering with a substitute, and only one patient sustained cerebrospinal fluid (CSF) leakage after surgery.

Conclusion: IDH mostly involves the lower cervical spine. More than half of the patients had spontaneous CIDH, and some had a relevant cervical trauma history. BSS was the main presentation. It is difficult to diagnose CIDH depending on clinical presentations and radiographic findings. Surgery was an effective treatment for CIDH and can provide a definitive diagnosis. With meticulous management of dural and arachnoid tears, the postoperative incidence of CSF leakage was found to be low.

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1. Introduction

Intradural disc herniation (IDH) is a rare condition for which diagnosis and treatment are challenging. In 1942, the first intradural disc rupture case, which involved the lumbar spine, was reported by Dandy. Subsequently, cases of cervical and thoracic intradural disc herniation have been described [1,2,3]. Cervical IDH (CIDH) is the least common and accounts for approximately

3% of all intradural herniations, whereas IDH in the thoracic and lumbar spine account for 5% and 92% of the cases, respectively [4,5]. The first CIDH was reported by Marega in 1959.

The presentations of CIDH vary in clinical practice and mainly include myelopathy and radiculopathy. Definitive preoperative diagnosis is difficult, and the pathogenesis and imaging characteristics have not been fully elucidated. Most publications describing CIDH are case reports, and there has been no systematic review of the literature. We conducted a systematic review and meta-analysis of the rate of occurrence, causes, presentation, imaging characteristics, diagnosis, management, prognosis, and pathogenesis of CIDH.

Abbreviations: BSS, Brown-Sequard's syndrome; CIDH, cervical intradural disc herniation; CT, computed tomography; IDH, intradural disc herniation; PLL, posterior longitudinal ligament; MRI, magnetic resonance imaging.

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2. Materials and methods

2.1. Literature search

This systematic review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) [6]. Potentially relevant literature was retrieved from PubMed and Embase from the earliest entry dates to 2017. The search strategy included combinations of the terms “disc(k)”, “intervertebral disc”, “cervical spine”, “intradural”, “transdural”, either as free words, keywords or as MeSH terms. The reference lists of retrieved articles were manually searched for relevant articles, and the abstracts were read for possible full text review and inclusion. Articles were screened and selected independently by two reviewers (Q.G and F.X). Disagreements were resolved by discussion, and a third author (Z.X) conducted an independent review if agreement was not reached.

2.2. Inclusion and exclusion criteria

The full text of articles written in English, published since inception, and involving human subjects were reviewed. Prospective clinical trials, retrospective studies, reports of case series, and case reports with data on cervical IDH were eligible for inclusion. Cadaver studies, laboratory or animal studies were excluded. Meta-analyses and systematic reviews were not included.

2.3. Data extraction

The names of the first and corresponding authors, type of study, publication date, number of patients, demographic characteristics of patients, history of neck trauma, presentation, imaging manifestation, disc level, management, outcome, dura repair, and duration of follow-up were extracted.

3. Results

3.1. Study selection

A total of 159 English language papers and case reports published from inception to 2017 were retrieved. After eliminating

duplicates, 95 articles were retained for further screening. Of these, 64 were excluded following review of their titles and abstracts, and 11 additional papers were excluded because they did not meet the inclusion criteria [2,4,27–35]. Ultimately, 20 articles describing a total of 23 patients were included in this systematic review [7–26]. The selection process is shown in Fig. 1.

3.2. Study characteristics

The included studies were all case reports. The articles were published between 1982 and 2017. The numbers of patients in the reported studies ranged from one to three. Eight studies had been conducted in Europe, seven in Asia, four in North America, and one in South America (Table 1).

3.3. Patient characteristics

The average age of the patients in the articles was 46.0 years (range, 24–80 years); 60.9% of all patients were male (n = 14). The follow-up time was reported for 17 patients, with an average of 10.6 months. The most common involved level was C5–6 (43.5%, n = 10), followed by C6–7 (30.4%, n = 7), C4–5 (13%, n = 3), and C3–4 (13%, n = 3). Relevant cervical trauma as a part of patient history was demonstrated in nine (39%) cases. The trauma included neck manipulation, heavy weight lifting, whiplash injury, and car accident. Another 14 patients had no significant neck trauma injury history (Table 1).

3.4. Presentation

Brown–Sequard’s syndrome (BSS), including complete BSS, incomplete BSS, and BSS combined with Horner’s syndrome or radiculopathy, was the most common presentation (56.5%, n = 13), followed by quadriparesis (34.8%, n = 8), and radiculopathy (8.7%, n = 2). The intradural disc material was located on the right side mostly (52.6%, n = 10), followed by the left (36.8%, n = 7) and central (10.5%, n = 2). MRI, computed tomography (CT), and myelography were the frequently used imaging methods. Only three patients (13%) were diagnosed as having CIDH preoperatively, leaving most patients diagnosed intraoperatively (Table 2).

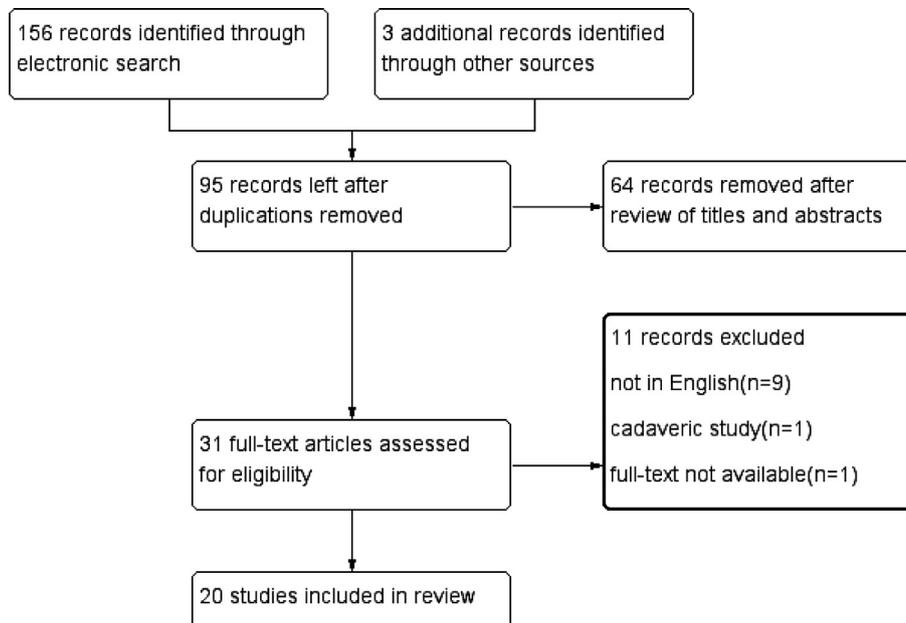


Fig. 1. Flow diagram showing selection of studies.

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