Translational Perioperative and Pain Medicine
ISSN: 2330-4871 (Open Access)
Review

Perioperative management of Diffuse Idiopathic Skeletal Hyperostosis

Bao Ha MD, Renyu Liu MD, PhD, Elizabeth Valentine MD

Department of Anesthesiology and Critical Care

Perelman School of Medicine at the University of Pennsylvania

Abstract: Diffuse Idiopathic Skeletal Hyperostosis (DISH) is a non-inflammatory enthesopathy ossifying the anterolateral spine and sparing the disc and joint space. Typically diagnosed by radiologic findings, this condition may be encountered in an otherwise asymptomatic patient. As a result, DISH can present complications at various stages of perioperative care, especially for the anesthesiologist and immediate post-operative care providers. The anesthesiologist particularly should be knowledgeable of how this disease process manifests and can affect the ability to perform neuraxial anesthesia, airway management, and post-operative care. With this knowledge, one will be more equipped to handle potential scenarios and better care for patients with this condition. This article reviews the presentation and diagnosis of DISH and summarizes some of the common anesthetic issues encountered in this patient population.

Key Words: Diffuse Idiopathic Skeletal Hyperostosis, perioperative management, anesthesia

Diffuse Idiopathic Skeletal Hyperostosis (DISH) is characterized as a non-inflammatory enthesopathy ossifying the anterolateral spine and sparing the disc and joint space. DISH is more common in elderly men and occurs mostly at thoracic levels but also commonly in the cervical spine. As the name suggests, DISH does not have a known cause although it is associated with metabolic abnormalities such as obesity and Type 2 diabetes mellitus. Dietary habits and certain medications, including the long term use of antidepressants, have also been associated with DISH. Pathophysiologically, it has been hypothesized that longstanding metabolic derangement leads to an increase in production of several growth factors and changes in inflammatory mediators that ultimately results in abnormal bone deposition.[1]

Patients with DISH may complain of symptoms including joint (especially spine) stiffness, back pain, dysphagia (from cervical spine osteophyte impingement of esophagus), paralysis, myelopathies, snoring, obstructive sleep apnea, or pulmonary infections from restrictive disease. The diagnosis of DISH is made based on radiographic findings on x-ray, computed tomography (CT), or magnetic resonance imaging (MRI). Taljanovic et al. describe the typical radiologic features well in a short review.[2] Imaging prerequisites include 1) calcification and ossification of the anterolateral aspect of at least four contiguous vertebral bodies, 2) relative preservation of intervertebral disk height (so as to distinguish DISH from intervertebral osteochondrosis), and 3) absence of features indicative of ankylosing spondylitis. Clinical symptomatology may not correlate with radiographic disease burden, and symptoms may be absent even in the face of radiologic findings. Although a pathologically distinct process, ankylosing spondylitis may present in a similar manner.

DISH can present complications at various stages of perioperative care, especially for the anesthesiologist and immediate post-operative care providers. This review will summarize some of the common anesthetic issues encountered in this patient population.

Neuraxial anesthesia

Abnormal ossification in DISH is not limited to the anterior longitudinal ligament and may also affect the ligaments connecting the laminae, spines, and

transverse processes (i.e., supraspinous, interspinous, and ligamentum flavum) and the zygopophyseal joints. [3] Abnormal osteophytes may also be present. The combination of abnormal ligamentous ossification and bony impingement may result in spinal stenosis with ensuing myelopathy.[4] The anesthesia provider should be cognizant of any underlying neurologic deficits prior to instrumentation of the neuroaxial space. Thorough consideration of risks and benefits must be weighed before proceeding with this technique. Should neuroaxial instrumental be attempted, the anesthesia provider may encounter difficulty in accessing interspaces in order to successfully deliver an anesthetic. Finally, DISH may compromise the provider's typical ability to utilize landmarks and tactile changes may be partially compromised depending on the extent and character of disease.

Airway management

Numerous case reports have documented difficulty with airway management in patients with DISH. Problems may be encountered both with ventilation and intubation. Osteophyte formation on the anterior aspect of the spine may cause airway edema and/or anterior bulging of soft tissue in the oropharynx and subglottic airway. Karkas and colleagues describe a presentation of DISH with dyspnea, choking, and stridor.[5] The patient was found to have significant edema at the level of the aryepiglottic folds, arytenoids, post-cricoid area, and posterior hypopharyngeal wall, impinging upon the hypopharyngeal lumen. The vocal cords were fixed and immobile in the paramedian position. The combination of significant laryngeal edema and cervical neck stiffness rendered laryngoscopy was unsuccessful and subsequently an awake tracheostomy was performed. The patient underwent a trial of corticosteroid therapy and laser debulking to widen the airway, followed by neurosurgical decompression. Subsequent fiberoptic laryngoscopy showed interval improvement of the edema and the tracheostomy was decannulated several weeks after decompression. Nelson et al. also describe a case series wherein three patients with DISH required tracheostomy for airway obstruction. [6] Certo and colleagues report bilateral vocal cord paralysis attributed to DISH.[7]

Baxi and Gaiwal describe a case of elective awake fiberoptic intubation for known DISH despite a reassuring airway examination including easy visualization of the soft palate, fauces, uvula and pillars (Mallampati class I) and unhindered flexion and extension of the cervical spine.[8] After sedation and topicalization with local anesthetics, fiberoptic laryngoscopy through a Williams airway resulted in a barrier of a large mass from the posterior pharyngeal wall to the base of the tongue. After several difficult attempts, the team successfully passed a flexible fiberoptic bronchoscope and the vocal cords could only be visualized briefly with deep inspiration.

Gokce et al. report a scenario in which endotracheal intubation was not possible, and ventilation was instead maintained successfully with laryngeal mask airway (LMA).[9] Post-operative care was complicated by severe stridor and hypoxia, again necessitating LMA placement. Otorhinolaryngologic consultation revealed anterior hyperostosis causing tracheal deviation and subglottic stenosis. Even with visualization of the vocal cords on laryngoscopy, this burden was a barrier to endotracheal tube placement. Crosby similarly described a patient in whom cervical osteophytes caused not only anterior dislocation of the larynx and subglottic stenosis, but also an acute angulation to the trachea that prevented passage of all but a pediatric endotracheal tube (ETT).[10]

Ozkalkanli et al. described a case of anterior osteophyte resection which was complicated by patient refusal for awake intubation and unavailability of a flexible fiberoptic bronchoscope at the institution. [11] Physical exam revealed osteophytes creating mass effect on the subglottic airway. In this case, mask ventilation was moderately difficult, attributed to limited neck mobility, but direct laryngoscopy allowed passage of a 6.0mm ETT. A larger diameter ETT could not be placed due to a mass from the posterior pharynx obstructing passage. In this scenario, although successful intubation was performed on one attempt, they were prepared with an intubating LMA, a variety of differently sized endotracheal tubes, multiple laryngoscope blades, and tools and personnel for an emergency tracheostomy.

Palmer and colleagues describe a patient in whom successful awake intubation was performed via intubating LMA.[12] This approach was undertaken after multiple failed attempts and direct laryngoscopy for

previous surgeries and successful ventilation had been established via LMA in previous anesthetics. After intravenous sedation and adequate topicalization, an intubating LMA was placed with the patient breathing spontaneously, and an uneventful trans-LMA fiberoptic intubation was performed.

Taken together, these case reports suggest that a diagnosis of DISH should at least raise the possibility of difficult airway management, even in the absence of obvious clinical symptoms by history or physical exam. Appropriate preparations for difficult airway management should be ensured prior to induction of anesthesia.

Extubation and Postoperative Care

Any difficulty in intubation should alert the clinician to potential complications following extubation. Baxi and Gaiwal elected to shift postoperative care to an intensive care unit given difficulty with airway management and observed respiratory dysfunction. Airway edema was suspected and extubation occurred 36 hours post-operatively over a fiberoptic bronchoscope.

DISH patients are also at increased risk of aspiration in the perioperative setting. Potential mechanisms, beyond that of residual sedation, include: 1.) restricted epiglottic motility and incomplete protection of the lower airways, 2.) incomplete glottic closure due to recurrent laryngeal nerve dysfunction and restricted vocal fold motility, 3.) restricted laryngeal movement, and 4.) periesophageal spasm.[13] It is prudent to delay extubation until the patient demonstrates full awakening from residual anesthesia and to extubate with the head of bed elevated to help prevent the likelihood of perioperative aspiration.

While there are no suggestions of chronic pain linked to patients with DISH as compared to the general population, providers should be aware of baseline joint discomfort and range of motion limitations. As other musculoskeletal disorders, DISH may require special attention to intra-operative positioning if there are limitations preoperatively. Specific therapeutic interventions in DISH have not been systematically explored, and both intra- and post-operative pain management should take into consideration of pre-operative use of non-steroidal anti-inflammatory drugs or opioids taken for joint discomfort. [2] These considerations will vary according to patients and their respective surgeries.

In conclusion, management of patients with DISH may pose unexpected complications in the perioperative period. Every anesthetic plan must include a thorough history and physical exam as well a review of any labs and imaging. DISH should raise a high suspicion for difficulty in airway management. The availability of appropriate rescue equipment to handle such situations is paramount.

Conflict Interests Disclosure

The authors have no conflicting interests to disclose.

Corresponding Author

Elizabeth Valentine MD. Assistant Professor; Assitant Director of Preoperative Medicine, Department of Anesthesiology and Critical Care, Perelman School of Medicine at the University of Pennsylvania, 3400 Spruce Street, Philadelphia, PA 19104

Editor

Jian-zhong Sun, MD, PhD, Professor, Department of Anesthesiology, Jefferson University.

Email: jian-zhong.sun@jefferson.edu

Disclosure of Funding

None

Additional publication details

Journal short name: Transl Perioper & Pain Med
Received Date:Aug 1, 2015
Accepted Date: Dec 29, 2015
Published Date: Dec 30, 2015
Transl Perioper & Pain Med 2016; 1(1):20-23

Citation and Copyright

Citation:Ha B, Liu R, Valentine E. Perioperative management of diffuse idiopathic skeletal hyperostosis. Transl Perioper & Pain Med 2016; 1(1): 20-23

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