

Deep Neck Space Infections: Retrospective Evaluation of Conservative Management Versus Surgical InterventionPratyush Kumar¹, Swapnil², Deepshikha Mishra³, Neel Prakash⁴¹Junior Resident (Academic), Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India²Junior Resident (Academic), Department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India³Senior Resident, Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India⁴Junior Resident (Academic), Department of ENT, Patna Medical College and Hospital, Patna, Bihar, India

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Abstract:

Background: Deep neck space infections (DNIs) are potentially fatal disorders that affect the neck's deep cervical spaces and fascial planes. Due to their fast growth, complicated architecture, and closeness to critical structures including the airway, major arteries, and mediastinum, DNIs continue to provide important therapeutic issues even though their prevalence has decreased in the antibiotic era. The most frequent etiological causes are still tonsillopharyngeal and odontogenic infections, which are frequently impacted by concomitant diseases, delayed presentation, and poor dental hygiene.

Aim: To compare conservative and surgical treatment for patients with deep neck space infections in order to assess the clinical profile, etiological variables, management approaches, and results.

Methodology: At a Patna Medical College and Hospital, Patna. 75 people who had been identified with deep neck space infections were looked at in a historical observational study. Analysis was done on demographic information, etiology, affected neck spaces, treatment technique, complications, and results.

Result: The majority of patients were between the ages of 21 and 60, and male preponderance was seen. The submandibular space was most commonly affected, and odontogenic infection was the most prevalent cause. In most cases, surgery was necessary. For several patients, conservative treatment worked. With minimal rates of complications and death, the majority of patients fully recovered.

Conclusion: For deep neck space infections to have the best possible results, early diagnosis, suitable imaging, and prompt action are essential.

Keywords: Odontogenic Infection, Deep Neck Space Infection, Conservative Therapy, Surgical Intervention, and Neck Abscess.

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Introduction

Deep neck space infections (DNIs) are dangerous bacterial infections that affect the neck's fascial planes and deep cervical space. They can be difficult to diagnose. Due to the availability of antibiotics, several scientists have observed that the prevalence of DNIs is today lower than it was in the past [1]. However, because of their severity, morbidity, and high death rates of 10%–40% linked to sepsis and organ failure, particularly when they descend into the mediastinum, DNIs continue to be an unresolved issue for doctors.

The primary problem is from the disease's sneaky progression; in fact, if left untreated, a local infection may develop into DNI, which might lead to

descending mediastinitis or airway collapse. Descending Necrotizing Mediastinitis (DNM) is one of the serious and sometimes fatal consequences that can result from abscesses, cellulitis, and phlegmons spreading down the fascial planes from the base of the skull to the mediastinum [2].

Odontogenic (35–42%) and pharyngotonsillitis infections are the most frequent main causes of DNIs. Additional reasons include malignancies, lymphadenitis, infected cysts, jugular intravenous drug usage, piercing or traumatic trauma to the head and neck region, sialadenitis, foreign substances, and iatrogenic factors such previous surgery and dental operations [3].

There are several possible gaps between the neck's fascial planes due to the superficial and multilayered deep fascia. Deep Neck Space Infection (DNI) is the term for infectious involvement of these fascial planes that results in cellulitis or abscess development. Important neck structures are somewhat shielded from infection by fascial layers, but the infection can readily pass between these planes and spread from one neck region to another. Although deep neck infections (DNIs) can be fatal, the mortality rate from these illnesses has decreased in the modern age [4].

The decrease in mortality rate can be adequately attributed to the availability of potent antibiotics, improved diagnostic techniques, and improved surgical clearance as a result of improved anesthesia techniques. The causes of tonsillitis, dental cavities, trauma, IV drug usage, sialadenitis, and shifting trends throughout time are only a few examples. The usually cultivated organisms in the culture specimen of DNIs are polymicrobial flora, which includes Streptococci, Pepto streptococci, Staphylococci, and anaerobes in various combinations [5].

For a successful result, prompt intervention (surgical drainage, debridement, and airway control) is essential. However, a number of consequences, including mediastinitis, upper airway obstruction, septic emboli, carotid artery erosion and rupture, venous thrombosis, septic shock, and mortality, can be caused by poor or nonexistent therapy, related comorbidities, and immunosuppressive conditions [6]. The literature covered the significance of a quick and precise DNI diagnosis and treatment approach in great detail.

Making a differential diagnosis with other potential causes of neck swelling, such as metastatic lymph nodes, is crucial for the diagnostic approach. The main components of the therapeutic approach are managing the airways (which are frequently compromised), antibiotic therapy, DNI surgical incision, and drainage; identifying and eliminating the potential source of infection (such as periodontal diseases, dental curries, or infected tonsils); and, if complications arise, treating them [7].

In order to comprehend the complexities of managing deep neck space infections (DNIs), this investigation of 75 DNI cases treated at a tertiary healthcare facility in 2019 attempts to characterize the current epidemiological and etiological trends for DNIs. With a focus on the significance of adequate imaging in the diagnostic context and the relevance of the multidisciplinary approach based on the severity of the infection, this seeks to present our clinical and surgical experience in the care of DNIs.

Methodology

Study Design: The purpose of this retrospective observational study was to compare conservative care

with surgical intervention in order to assess the clinical characteristics, treatment approaches, and results of patients with deep neck space infections (DNIs).

Study Duration: The study was carried out over a period of one year.

Study Area: The study was carried out at Patna Medical College and Hospital Department of Otorhinolaryngology (ENT).

Sample Size: A total of 75 patients diagnosed with deep neck space infections during the study period were included in the study.

Sampling Technique: The method of successive sampling was applied. Until the intended sample size was reached, all patients who met the inclusion criteria were hospitalized during the research period were included.

Inclusion Criteria

- Patients of all age groups and both genders
- Patients diagnosed clinically and/or radiologically with deep neck space infections
- Patients managed either by conservative treatment or surgical intervention
- Patients with complete medical records available for review

Exclusion Criteria

- Patients with superficial neck infections not involving deep neck spaces
- Patients with neck swellings are due to malignancy, tuberculosis, or traumatic causes
- Patients with incomplete or missing medical records
- Patients who are left against medical advice before completion of treatment

Data Collection: Data from hospital medical records of patients hospitalized throughout the research period and diagnosed with deep neck space infections were gathered retrospectively. A standardized data extraction proforma was used to evaluate case files. Demographic information, presenting symptoms, etiological factors, comorbidities, clinical findings, radiological investigations, neck space involvement type and extent, treatment modality (conservative or surgical), length of hospital stay, complications, and outcome were all retrieved. To guarantee data accuracy and completeness, pertinent laboratory and imaging reports were also examined.

Procedure: At the time of admission, every patient in the study underwent a thorough clinical examination. When necessary, radiological tests, such as ultrasonography or contrast-enhanced computed tomography of the neck, were then performed. Patients were treated conservatively or surgically depending on their airway state, imaging results, and

clinical severity. Intravenous wide range antibiotics, analgesics, anti-inflammatory medications, and well monitored supportive care were all part of conservative therapy. Surgical intervention included airway control where necessary, as well as abscess incision and drainage under the proper anaesthesia. Up to discharge, the course of treatment, response to therapy, complications, and results were recorded.

Statistical Analysis: Software called the Statistical Package for Social Sciences (SPSS) was used to assemble and analyse the data. Clinical and demographic characteristics were summarised using descriptive statistics. Frequencies and percentages were used to represent categorical data and mean and standard deviation were used to represent continuous variables. A p value of less than 0.05 was

deemed statistically significant, and appropriate statistical tests were used."

Result

Table 1 shows the study of the population's demographic characteristics. Males accounted for around two thirds of the cases, demonstrating a definite male preponderance and a greater vulnerability or exposure to predisposing variables. The age distribution revealed that the majority of patients were between the ages of 21 and 60, indicating that middle-aged people are more likely to get deep neck area infections. Increased exposure to upper respiratory tract and odontogenic illnesses as well as delayed healthcare seeking behaviour in this age group might account for this tendency.

Variable	Number of Patients	Percentage (%)
Gender		
Male	48	64
Female	27	36
Age Group (years)		
≤20	9	12
21–40	26	34.7
41–60	28	37.3
>60	12	16

Table 2 shows how deep neck space diseases are caused by different things. The most frequent cause was found to be odontogenic infections, which supports the idea that untreated dental infections and poor oral hygiene contribute to the development of deep neck infections. After sialadenitis, tonsillopharyngeal infections were the second most common

cause. Trauma, iatrogenic causes, or infected cysts accounted for a lesser percentage of cases. The underlying source of infection was not found in a significant percentage of individuals, which might be related to late presentation or previous antibiotic use.

Etiology	Number of Cases	Percentage (%)
Odontogenic infection	30	40
Tonsillopharyngitis	18	24
Sialadenitis	9	12
Trauma / Iatrogenic	6	8
Infected cysts / lymphadenitis	5	6.7
Unknown cause	7	9.3
Total	75	100

Table 3 provides a concise summary of the anatomical distribution of the infected neck spaces. The parapharyngeal region and the submandibular space were the most affected areas. Due to the aggressive nature of the illness and its propensity to spread

along cervical fascial planes, a considerable percentage of patients had multispacer involvement. Because multispacer involvement is frequently linked to higher morbidity, the need for surgery, and longer hospital stays, it is clinically significant.

Neck Space Involved	Number of Patients	Percentage (%)
Submandibular	22	29.3
Parapharyngeal	16	21.3
Retropharyngeal	9	12
Multispacer involvement	20	26.7

Prevertebral	4	5.4
Parotid	4	5.3
Total	75	100

Table 4 displays the treatment modalities that were implemented for the study population. While a lower percentage of patients were effectively treated with conservative therapy alone, the majority of patients required surgical surgery. This study implies that advanced infections with abscess development

frequently require surgical drainage, even if cellulitis and early-stage infections may respond well to intravenous antibiotics. The severity of illnesses upon presentations at a tertiary care referral centre is reflected in the increased surgical rate.

Mode of Treatment	Number of Patients	Percentage (%)
Conservative management	28	37.3
Surgical intervention	47	62.7
Total	75	100

In Table 5, the outcomes of patients who were conservatively managed and those who underwent surgical intervention are compared. Patients in the conservative treatment group experienced fewer complications and a shorter mean length of hospital stay. Surgically treated patients, on the other hand, had

higher rates of complications and longer hospital admissions, which are probably more indicative of a more severe illness at presentation than of treatment failure. Despite these variations, both groups' overall recovery rates remained high, demonstrating the efficacy of well-chosen treatment techniques.

Outcome Variable	Conservative (n=28)	Surgical (n=47)
Mean hospital stay (days)	4.2 ± 1.6	8.5 ± 3.2
Complications	2 (7.1%)	11 (23.4%)
Need for airway intervention	0	7 (14.9%)
Complete recovery	27 (96.4%)	44 (93.6%)
Mortality	1 (3.6%)	3 (6.4%)

In Table 6, the complications associated with deep neck space infections in the study population are described. Many patients experienced minimal problems, highlighting the advantages of prompt diagnosis and treatment. The most frequent consequences among individuals who had them were airway obstruction, mediastinitis, and sepsis. Internal jugular

vein thrombosis and other uncommon yet dangerous consequences were also noted. Despite the fact that problems only occurred in a small percentage of patients, they highlight the potentially fatal nature of deep neck space infections and the significance of close observation.

Complication	Number of Patients	Percentage (%)
Airway obstruction	6	8
Mediastinitis	4	5.3
Sepsis	3	4
Internal jugular vein thrombosis	2	2.7
No complications	60	80
Total	75	100

Discussion

Our analysis of deep neck space infection (DNI) data revealed several important aspects of the disease process. The findings of this study may assist clinicians in the effective management of these potentially life-threatening conditions. Notably, ten patients, primarily younger individuals, those without comorbidities, or those with minimal collections confirmed radiologically, responded well to conservative management or repeated needle aspiration.

These results align with previous studies advocating cautious, non-surgical management in selected cases" [8].

Nearly two-thirds of our patients had mild to moderate anemia when assessed according to WHO standards for identifying anemia based on hemoglobin levels. Given that 50% of our patients had anemia in their first ten years of life, this can be linked to children's heightened vulnerability to infections.

However, it requires more analysis because we do not yet have any control data in this regard [9].

A proper diagnosis and timely therapeutic therapy are crucial for DNIs since they continue to be potentially fatal illnesses. The potentially fatal complications include carotid arterial erosion, thrombosis of the cavernous sinus, suppurative thrombophlebitis of the internal jugular vein associated with pulmonary septic embolism, descending necrotizing mediastinitis, and septic shock, particularly in patients with comorbidities or compromised immune systems [10]. The fact that URTIs are now appropriately and successfully treated with antibiotics provides an easy explanation for the shift in etiology. Tobacco chewing practices that result in poor oral hygiene and periodontal illnesses may be the reason of the rise in periodontal disease in this research population.

All patients with possible DNI must have a thorough head and neck physical examination together with a flexible fiberoptic assessment of the upper airway for an accurate diagnosis. These individuals usually have leukocytosis as a result of the infection. A concurrent viral infection, immunological deficiencies, medications, or diseases like cancer can all cause a lack of leukocytic response [11]. Another crucial factor that is highly relevant to take into account is the function of secondary otalgia. Atypical symptoms, such as reflecting otalgia, might sometimes cause the clinical diagnosis to be incorrect.

Due to signs of dyspnea, the infection's mediastinal progression, and/or extended postoperative intubation, some patients needed a tracheostomy to protect their airways. The most popular treatment approaches to preserve the airway are tracheostomy and orotracheal intubation [12]. It has been well acknowledged that safeguarding the airway is crucial in the management of DNI. All challenging intubation situations, such as the presence of indicators of a blocked upper airway, severe oral trismus, twisted neck architecture, significant pharyngeal wall bulging, or catastrophic laryngeal oedema, are indicative of tracheostomy in clinical practice. Furthermore, prolonged intubation (more than two weeks) is a common rationale for tracheostomy [13].

Because deep neck space infections can advance quickly and result in potentially fatal consequences, they continue to be a major clinical issue. The results of the current study, which are in line with previous research, showed a male preponderance and a greater prevalence among middle-aged persons. The primary etiological component was shown to be odontogenic infections, highlighting the need for oral health and early referral. Due to the tendency of these infections to progress along cervical fascial planes, multispacer involvement was frequently observed. While some patients with early illnesses responded well to conservative treatment, most

needed surgery, especially those with airway impairment or abscess development. This study's overall low mortality and positive results demonstrate the need for rapid diagnosis, proper imaging, sensible antibiotic treatment, and timely surgical surgery where necessary.

Conclusion

This study demonstrates that deep neck space infections, while potentially life-threatening, remain manageable with early diagnosis and appropriate treatment. The most prevalent etiological causes were tonsillopharyngeal and odontogenic infections, which often affected the parapharyngeal and submandibular regions. Surgical surgery is still the mainstay of treatment for severe infections, even if conservative management may be effective in carefully chosen patients. The low rates of complications and death highlight the need of a multidisciplinary approach, contrast-enhanced imaging, and early clinical assessment. In order to enhance patient outcomes and avoid potentially deadly complications, prompt and customized care measures are crucial.

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