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Deep Neck Space Abscess: A Single-Center Analysis of 100 Patients Who Underwent External Surgical Drainage

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Abstract

Objective

This study aimed to investigate the clinical characteristics and outcomes of patients with deep neck space abscess (DNSA) and to identify factors associated with the need for tracheostomy and a prolonged hospital stay.

Methods

We retrospectively reviewed 100 patients with DNSA who underwent external surgical drainage and intravenous antibiotic therapy at Hokuto Hospital, Japan, between April 2007 and March 2026. The number of involved neck spaces on contrast-enhanced CT (CECT), white blood cell (WBC) counts, and C-reactive protein (CRP) levels, and laryngeal edema scores assessed by fiberoptic laryngoscopy were evaluated.

Results

The most common etiology was odontogenic infection, observed in 34 patients (34%), followed by salivary gland infection in 19 (19%) and pharyngotonsillar infection in 15 (15%). Tracheostomy was performed in 11 patients (11%), all of whom had laryngeal edema scores of 3-5. No patients developed descending necrotizing mediastinitis or airway obstruction, and there were no deaths. Univariate logistic regression analysis revealed that the need for tracheostomy and prolonged hospital stay were significantly associated with older age ($p = 0.029$ and $p = 0.006$, respectively), elevated WBC count ($p = 0.014$ and $p < 0.001$, respectively), elevated CRP level ($p < 0.001$ for both), and a greater number of involved neck spaces ($p < 0.001$ and $p = 0.007$, respectively). Multivariate logistic regression analysis identified tracheostomy as an independent predictor of prolonged hospital stay ($p = 0.006$).

Conclusions

A severe condition, marked by involvement of multiple deep neck spaces, elevated inflammatory markers, and higher laryngeal edema scores, was associated with an increased need for a tracheostomy and a longer hospital stay. Accurate diagnosis and prompt surgical drainage may improve clinical outcomes in patients with DNSA.

Categories: Otolaryngology, Oral Medicine, Infectious Disease
Keywords: c-reactive proteins(crp), deep neck space abscess, duration of hospital stay, early tracheostomy, laryngeal edema score

Introduction

Deep neck space abscess (DNSA) is a severe infection characterized by abscess formation within the deep spaces of the head and neck. It can occur at any age and may arise from various etiologies [1]. Although the widespread use of antibiotics and improvements in dental care have reduced the prevalence of DNSA and the incidence of its complications, it remains a potentially life-threatening condition that can result in serious complications, including airway obstruction, descending necrotizing mediastinitis, and sepsis [1-4]. The reported mortality rate ranges from 1.6% to 7.6% [1].

The clinical manifestations of DNSA include pain, neck swelling, odynophagia, dysphagia, trismus, dysphonia, and dyspnea [1]. Prompt and accurate diagnosis requires careful clinical examination, contrast-enhanced CT (CECT), blood tests, and laryngeal fiberoptic examination. Management generally requires a multidisciplinary approach involving surgical drainage, intravenous antibiotic therapy, and airway management. Timely intervention is crucial for minimizing complications and reducing mortality [1]. This

study aimed to evaluate the clinical characteristics and outcomes of patients with DNSA who underwent external surgical drainage over a 19-year period and to identify factors associated with the requirement for tracheostomy and the length of hospital stay through an analysis of the associations between various clinical variables.

Materials And Methods

Patient selection and characteristics

The study group consisted of 100 Japanese patients with DNSA who were treated with external surgical drainage and intravenous antibiotics from April 2007 to March 2026 at the Department of Otolaryngology-Head and Neck Surgery and the Department of Dentistry and Oral Surgery, Hokuto Hospital, Hokkaido, Japan. Medical records were retrospectively reviewed for the following variables: age, sex, smoking status in the past month, antibiotic use, and comorbidities (including diabetes mellitus (DM), steroid use, and dialysis for renal failure). Also reviewed were the highest body temperature recorded between admission and external surgical drainage; the duration from symptom onset to external surgical drainage; inflammatory markers on admission, including white blood cell (WBC) count and C-reactive protein (CRP) level; surgical drainage methods; intravenous antibiotic use; duration of hospital stay; and complications after discharge. We excluded patients with isolated alveolar abscess, peritonsillar abscess, or retropharyngeal abscess. We also excluded patients treated with transoral drainage without external surgical drainage, patients with mediastinitis at the first visit, patients with abscesses secondary to head and neck malignancies, and patients with tuberculosis (Figure *1*).

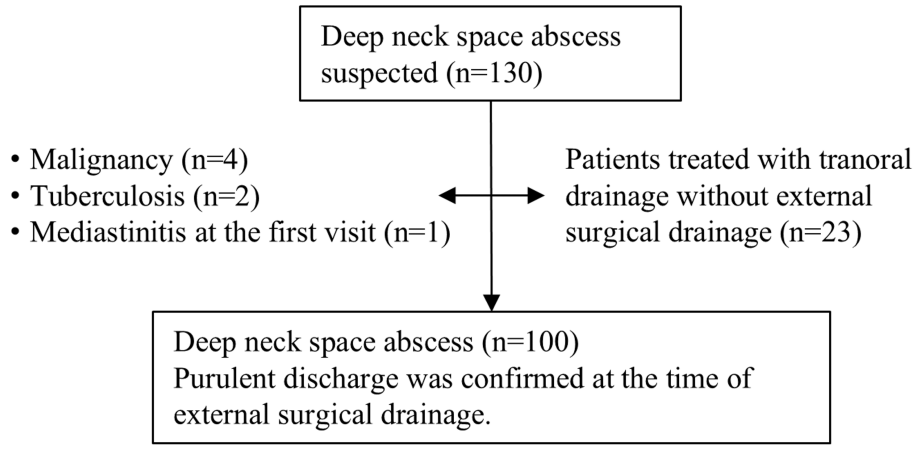


FIGURE 1: Flowchart of inclusion and exclusion criteria for the patient with DNSA

DNSA: deep neck space abscess

Clinical assessment

The causes of DNSA were determined from medical examinations, CECT findings, and histological findings (in cases involving congenital cysts or Warthin tumors). The involved neck spaces, number of spaces, maximum abscess diameter, and presence of gas formation were evaluated using CECT before external surgical drainage. The involved neck spaces were classified into 11 anatomical areas according to previously published descriptions [5]: masticatory, parotid, retropharyngeal, peritonsillar, parapharyngeal, sublingual, submandibular, anterior cervical, posterior cervical, carotid, and visceral. Representative images are shown in Figures *2A*-*2C*. The laryngeal edema score was evaluated using a laryngeal fiberscope as previously described for acute epiglottitis [4,6]. Briefly, epiglottic swelling was scored as follows: mild swelling, limited to the lingual surface, received a score of 1; moderate swelling, extending to the laryngeal surface with a U-shaped appearance, received a score of 2; and severe swelling, with the epiglottis appearing spherical or heart-shaped, received a score of 3. In addition, unilateral severe arytenoid swelling with poor visualization of the pyriform sinus was assigned 1 point, whereas severe bilateral swelling was assigned 2 points. The total score ranged from 0 to 5 (Figure *2D*).

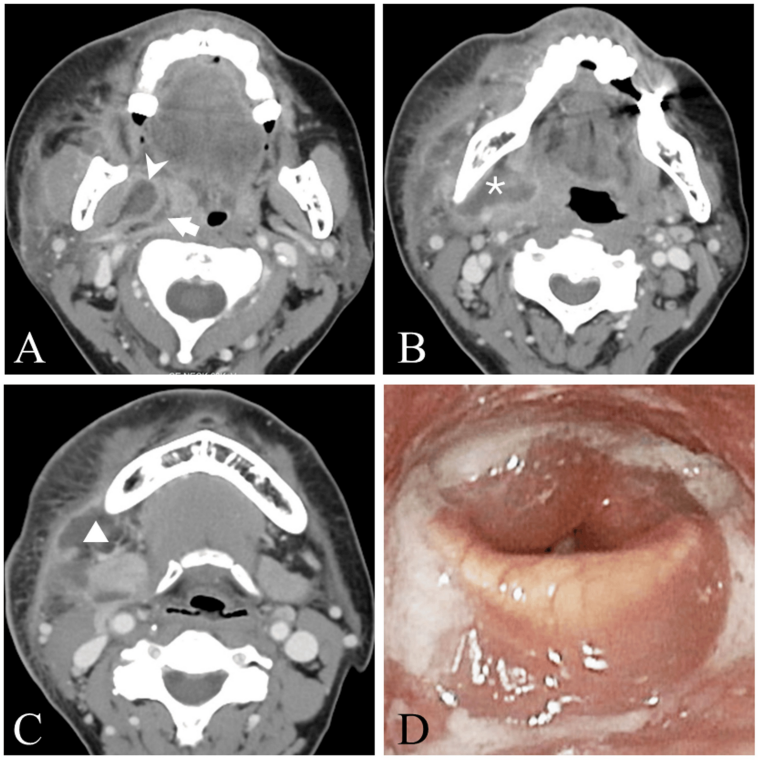


FIGURE 2: Representative images of a patient with DNSA

CECT revealed an abscess involving four neck spaces, including the peritonsillar (arrow) and parapharyngeal (arrowhead) (A), masticatory (asterisk) (B), and submandibular spaces (triangle) (C). A laryngeal fiberscope examination revealed moderate epiglottic swelling of both the lingual and laryngeal surfaces, with a score of 2 points, and severe swelling of the bilateral arytenoids, with a score of 2 points, providing a laryngeal edema score of 4 points (D)

DNSA: deep neck space abscess; CECT: Contrast-enhanced computed tomography

For airway management, tracheostomy was performed with the finding of laryngeal edema scores of 3-5 either before or simultaneously with external surgical drainage to prevent airway obstruction. Regarding external surgical drainage, local or general anesthesia was selected at the discretion of the attending surgeon. A skin incision was made at the site of maximal swelling or close proximity to the abscess identified on CECT. The abscess cavity was thoroughly irrigated with a saline solution. Intraoral or pharyngeal incision and drainage procedures were performed based in part on clinical and CECT findings. A conventional aerobic bacterial culture was conducted by swabbing the purulent discharge, which was then drained externally. Hospital discharge was determined according to the patient's general condition and the establishment of adequate oral intake, regardless of tracheostoma closure status.

Statistical analysis

Univariate logistic and linear regression were used to analyze the effect level using odds ratio (OR), standardized partial regression coefficient (SPRC), and confidence interval (CI). The Mann-Whitney U test was used to compare two independent groups. Statistical significance was set at $p < 0.05$. All statistical analyses were performed using the BellCurve for Excel version 4.10 (Social Survey Research Information, Tokyo, Japan). This study was approved by the Ethics Committee of Hokuto Hospital (approval number 1125)

Results

Patient characteristics

One hundred patients with DNSA, including 58 males (58%) and 42 females (42%), were enrolled in this study. The median patient age was 55 years (range: 4-95 years) (Table *1*), with the highest incidence observed among those aged 40-59 years (Figure *3*). Current smokers accounted for 30% of the patients (n = 30). Comorbidities, including DM, steroid use, or dialysis for renal failure, were present in 18 patients (18%). A body temperature exceeding 37.5°C was observed in 71 patients (71%). The median WBC count and CRP level were 12,120/μL (range: 4,230-26,240/μL) and 9.9 mg/dL (range: 0.2-36.6 mg/dL), respectively. The median and average duration from symptom onset to incision and drainage were seven and nine days,

respectively (range: 1-34 days).

Characteristic	Values
Age years, median (range)	55 (4-95)
Sex (male:female)	58:42
Smoking, n (%)	30 (30)
Comorbidity, n (%)	18 (18)
Body temperature, ≥ 37.5°C, n (%)	71 (71)
WBC, /μL, median (range)	12,120 (4,230-26,240)
CRP, mg/dL, median (range)	9.9 (0.2-36.6)
Gas formation, n (%)	13 (13)
Maximum abscess diameter, mm, median (range)	35 (20-110)
Involved neck space = 1 space, n (%)	45 (45)
2 spaces, n (%)	32 (32)
3 spaces, n (%)	8 (8)
4 spaces, n (%)	5 (5)
5 spaces, n (%)	6 (6)
6 spaces, n (%)	5 (5)
Laryngeal edema score = 0 point, n (%)	73 (73)
1 point, n (%)	13 (13)
2 points, n (%)	3 (3)
3 points, n (%)	4 (4)
4 points, n (%)	5 (5)
5 points, n (%)	2 (2)
Tracheostomy, n (%)	11 (11)
Bacteria isolation, n (%)	53 (53)
Duration from onset to drainage, days, median (range)	7 (1-34)
Duration of hospital stay, days, median (range)	7 (2-98)

TABLE 1: Characteristics of 100 patients with DNSA

Comorbidities included diabetes mellitus, steroid use, or dialysis for renal failure. Body temperature ≥ 37.5°C was recorded during the period from admission to drainage

DNSA: deep neck space abscess; WBC: white blood cell; CRP: C-reactive protein

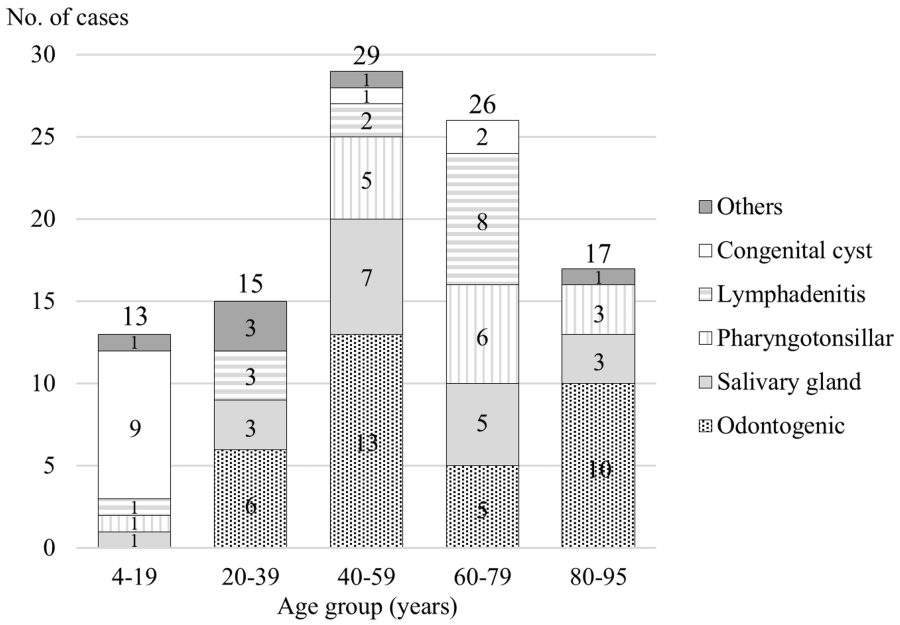


FIGURE 3: Age distribution relative to the cause of DNSA

DNSA: deep neck space abscess

Etiology of DNSA

The etiology of DNSA was odontogenic infection in 34 patients (34%), salivary gland infection in 19 (19%), pharyngotonsillar infection in 15 (15%), lymphadenitis in 14 (14%), and congenital cysts in 12 (12%) (Table *2*). Infected congenital cysts were the most common etiology among patients aged 4-19 years, accounting for nine of the 13 (69%) patients (Figure *3*). In contrast, odontogenic infection was the most frequent etiology among patients aged 80-95 years, accounting for 10 of the 17 patients (59%). Among the 34 patients with odontogenic DNSA, the submandibular space was the most frequently involved space in 23 patients (68%), followed by the sublingual space in 19 (56%), and the masticatory space in nine (26%) (Figure *4A*). Among the 15 patients with pharyngotonsillar infection, the peritonsillar space was involved in 14 patients (93%), followed by the parapharyngeal space in 12 (80%) (Figure *4B*).

Etiology	N (%)
Odontogenic	**34 (34%)**
Salivary gland infection	**19 (19%)**
Parotitis	9
Warthin tumor	4
Submandibular gland sialolithiasis	4
Parotid gland sialolithiasis	2
Pharyngotonsillar infection	**15 (15%)**
Peritonsillar abscess	11
Retropharyngeal abscess	2
Tonsillitis	2
Lymphadenitis	**14 (14%)**
Congenital cyst	**12 (12%)**
Thyroglossal duct cyst	3
Lateral cervical cyst	3
First branchial cleft cyst	3
Pyriform sinus fistula	3
Trauma	**2 (2%)**
Unknown	**4 (4%)**

TABLE 2: Etiology of DNSA in 100 patients

DNSA: deep neck space abscess

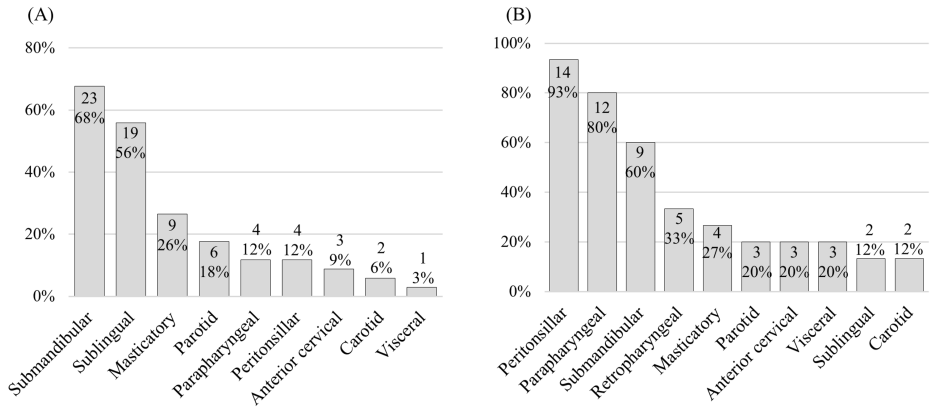


FIGURE 4: Frequency of the involved neck spaces

(A) Frequency of the involved neck spaces in 34 patients with DNSA caused by odontogenic infection. (B) Frequency of the involved neck spaces in 15 patients with DNSA caused by pharyngo-tonsillar infection

DNSA: deep neck space abscess

Laryngeal edema score, tracheostomy and CECT findings

Laryngeal edema was identified in 27 (27%) patients (Table *1*). The median laryngeal edema score was 0

(range: 0-5). Tracheostomy was performed in 11 patients with the finding of laryngeal edema scores of 3-5. Of the 11 patients who underwent tracheostomy, three (27%) underwent tracheostomy under local anesthesia and external surgical drainage a few days later. The other eight (73%) underwent tracheostomy under general anesthesia followed by external surgical drainage at the same time. The WBC count and CRP level of patients who required tracheostomy were significantly higher than those who did not undergo tracheostomy ($p = 0.012$ and $p < 0.001$, respectively) (Figure *5*). Gas formation was observed on CECT in 13 (13%) patients (Table *1*). Maximum abscess diameter was 35 mm (range, 20-110 mm). The median number of involved neck spaces was two (range: one to six), with one space in 45 patients (45%), two in 32 (32%), three in seven (7%), four in five (5%), five in six (6%), and six in five (5%) (Table *1*).

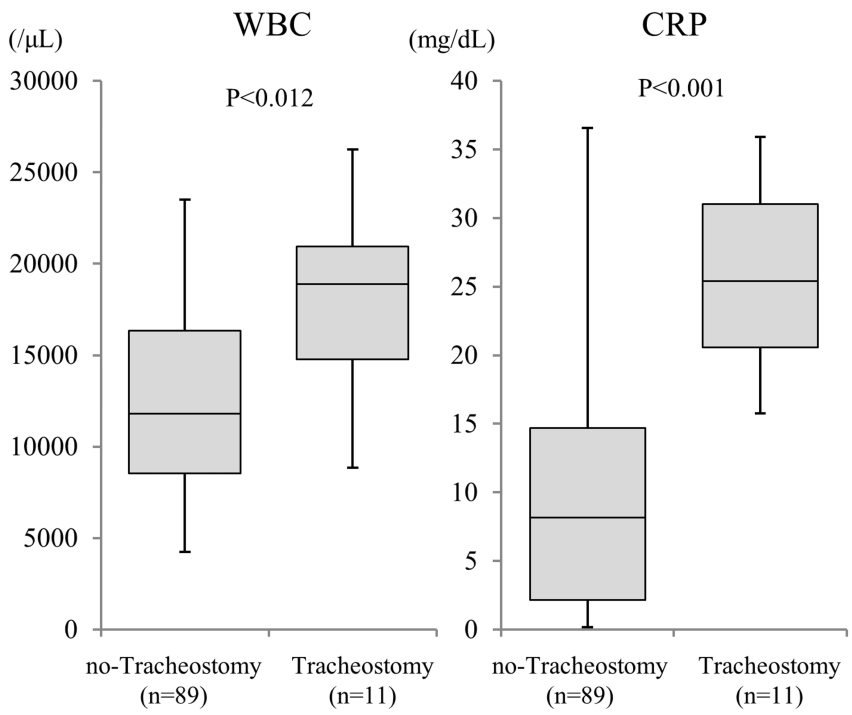


FIGURE 5: WBC counts and CRP levels of patients by tracheostomy status

WBC: white blood cell; CRP: C-reactive protein

Procedure of external surgical drainage

Overall, 66 patients (66%) underwent external surgical drainage under general anesthesia, whereas 34 patients (34%) underwent the procedure under local anesthesia. Intraoral incision and drainage were simultaneously performed in 12 of the 34 patients (35%) with odontogenic infection. In addition, nine of 11 patients (82%) with peritonsillar abscesses underwent simultaneous transoral peritonsillar abscess incision and drainage together with external surgical drainage.

Bacterial analysis and antibiotic administration

Bacterial pathogens were isolated from 53 patients (53%), including *α-Streptococcus* in 25 patients (25%) and *Streptococcus pyogenes* in five patients (5%) (Table *3*). Two bacteria were isolated from nine patients, and five bacteria were isolated from a patient. Among the remaining 47 patients, 18 (38%) had a history of antibiotic use before external surgical drainage. Intravenously administered antibiotics included ampicillin/sulbactam (ABPC/SBT) plus clindamycin (CLDM) in 39 patients (39%), ABPC/SBT alone in 32 (32%), ceftriaxone (CTRX) in nine (9%), cefazolin in five (5%), flomoxef plus CLDM in five (5%), CTRX plus CLDM in four (4%), and others in six (6%). The median and average duration of hospital stay were seven and 9.8 days, respectively (range: 2-98 days). Complications after discharge included severe dysphagia in two patients (2%) and skin defects requiring autologous skin grafting in one patient (1%). None of the patients presented with airway obstruction, and none progressed to descending mediastinitis or death.

Bacteria	N (%)
No bacteria isolated	**47 (47%)**
Bacteria isolated	**53 (53%)**
Streptococcus	36
α-Streptococcus	25
S. pyogenes	5
S. agalactiae	2
S. constellatus	2
S. intermedius	1
β-Streptococcus	1
Staphylococcus	12
MRSA	4
S. aureus	3
Staphylococcus sp.	3
MRCNS	2
Haemophilus	3
H. parainfluenzae	2
H. influenzae	1
Others	14
Corynebacterium sp.	3
Klebsiella oxytoca	2
Bacillus sp.	2
Lactobacillus sp.	2
Eikenella corrodens	1
Enterobacter cloacae	1
Escherichia coli	1
Moraxella catarrhalis	1
Prevotella sp.	1

TABLE 3: Isolated bacteria among 100 patients with DNSA

DNSA: deep neck space abscess; MRSA: methicillin-resistant *Staphylococcus aureus*; MRCNS: methicillin-resistant coagulase-negative *Staphylococcus*

Statistical analysis for tracheostomy and duration of hospital stay

Univariate regression analysis revealed that age ⩾ 65 years (p = 0.029), female sex (p = 0.039), WBC count ⩾ 15,000/μL (p = 0.014), CRP level ⩾ 10 mg/dL (p < 0.001), gas formation (p = 0.002), maximum abscess diameter ⩾ 40 mm (p = 0.006), and involvement of three to six neck spaces (p < 0.001) was significantly associated with the need for tracheostomy (Table *4*). Similarly, age ⩾ 65 years (p = 0.006), body temperature ⩾ 37.5°C (p = 0.006), WBC count ⩾ 15,000/μL (p < 0.001), CRP level ⩾ 10 mg/dL (p < 0.001), gas formation (p = 0.003), maximum abscess diameter ⩾ 40 mm (p = 0.005), involvement of three to six neck spaces (p = 0.007), and the need for tracheostomy (p < 0.001), was significantly associated with longer duration of hospital stay.

Characteristic		N (%)	Tracheostomy				Duration of hospital stay	
			+	–	OR	P-value	SPRC	P-value
			N = 11	N = 89	95% CI		95% CI	
Age, years	≥ 65	40 (40)	8	32	4.75	0.029*	1.443	0.006*
	< 65	60 (60)	3	57	1.176-19.18		0.039-0.232	
Sex	Female	42 (42)	8	34	4.314	0.039*	0.186	0.409
	Male	58 (58)	3	55	1.07-17.39		–0.024-0.059	
Smoking	+	30 (30)	2	28	0.484	0.373	–0.199	0.517
	–	70 (70)	9	61	0.098-2.388		–0.076-0.038	
Comorbidity	+	18 (18)	3	15	2.406	0.238	0.475	0.105
	–	82 (82)	8	74	0.558-10.357		–0.009-0.099	
Body temperature	≥ 37.5°C	71 (71)	11	60	1.421	0.418	2.55	0.006*
	< 37.5°C	29 (29)	0	29	0.834-5.482		0.068-0.412	
WBC, /μL	≥ 15,000	36 (36)	8	28	5.809	0.014*	2.169	< 0.001*
	< 15,000	64 (64)	3	61	1.432-23.566		0.086-0.321	
CRP, mg/dL	≥ 10	49 (49)	11	38	6.324	< 0.001*	3.791	< 0.001*
	< 10	51 (51)	0	51	1.527-32.258		0.179-0.533	
Bacteria isolation	+	53 (53)	10	43	1.452	0.121	0.764	0.081
	–	47 (47)	1	46	0.843-2.365		–0.009-0.153	
Gas formation	+	13 (13)	5	8	8.437	0.002*	1.442	0.003*
	–	87 (87)	6	81	2.098-33.924		0.048-0.224	
Maximum abscess diameter, mm	≥ 40	41 (41)	10	31	18.7	0.006*	1.538	0.005*
	< 40	59 (59)	1	58	2.287-152.995		0.044-0.245	
No. of involved neck spaces	3-6	24 (24)	9	15	22.2	< 0.001*	1.189	0.007*
	1-2	76 (76)	2	74	4.351-113.26		0.029-0.193	
Tracheostomy	+	11 (11)	11	0	N/A		2.158	< 0.001*
	–	89 (89)	0	89			0.087-0.319	

TABLE 4: Univariate logistic and linear regression analysis for tracheostomy and duration of hospital stay among 100 patients with DNSA

*P < 0.05 was considered statistically significant

+: present; –: not present. Comorbidities included diabetes mellitus, steroid use, or dialysis due to renal failure

DNSA: deep neck space abscess; WBC: white blood cell; CRP: C-reactive protein; OR: odds ratio; CI: confidence interval; SPRC: standardized partial regression coefficient; N/A: not analyzable

Discussion

DNSA is a serious and potentially life-threatening infection now, as it was in the past. Therefore, clinicians must have extensive knowledge of the structure of the deep neck space, its etiology, the strategy for assessing imaging, laboratory, and endoscopic findings, microbiology, and other factors that aggravate DNSA. Regarding sex distribution, 58% of the 100 patients were male. This male predominance aligns with previous reports and is reportedly related to higher smoking rates and poorer oral hygiene in males [7].

Regarding comorbidities, 18 patients (18%) in this study had a history of DM, steroid use, or dialysis for renal failure. DNSA in patients with DM has been reported to progress rapidly and become more severe [8]. Steroid therapy for autoimmune diseases also increases susceptibility to infections and can lead to severe odontogenic infections [4]. In addition, end-stage renal disease has been reported to be associated with an increased risk of complications in patients with DNSA [9,10]. Although these comorbidities were not significantly associated with the clinical factors evaluated in this study, careful systemic management remains essential in patients with DNSA.

Regarding etiology, odontogenic infection was the most common cause of DNSA, accounting for 34% of all cases in the present study. Previous studies have similarly identified odontogenic infection as the leading etiology, with reported frequencies ranging from 34% to 60% [2,11,12]. Salivary gland infection was the second most common cause, accounting for 19% of patients in our cohort. This category included parotitis, infected cysts arising from Warthin tumors, and submandibular or parotid sialolithiasis. Previous studies have described the progression of sialadenitis to DNSA, particularly in elderly and immunocompromised patients [13]. Pharyngotonsillar infections, including peritonsillar abscesses, retropharyngeal abscesses, and tonsillitis, were the third most common source of infection, accounting for 15% of the cases in the present study. In contrast, several previous reports have identified pharyngotonsillar infection as the predominant etiology, representing approximately 27% to 39% of DNSA cases [12,14,15]. Congenital cysts were identified as the cause of DNSA in 12 patients (12%) in the present study. Infected congenital cysts were the most common cause of DNSA among patients aged < 20 years.

Regarding the inflammatory markers of WBC count and CRP level, previous studies have demonstrated that elevated WBC count is significantly correlated with multiple-space involvement in patients with DNSA [16]. CRP levels have also been reported as reliable predictors of DNSA severity [17]. One study reported that patients with systemic comorbidities and elevated CRP levels are more likely to develop complicated DNSA [18]. In the present study, the WBC count and CRP level of patients who required tracheostomy were significantly higher than those who did not undergo tracheostomy, suggesting that elevated inflammatory markers are associated with more severe infections and a higher risk of airway compromise.

The submandibular space was the most frequently affected anatomical space, accounting for 45% of the 100 patients examined in this study. This finding is likely attributable to the high proportion of odontogenic infections in our cohort. It is anatomically plausible because the roots of the mandibular molars are located in close proximity to the submandibular space, and the cervical fascial planes provide a direct route for the spread of odontogenic infections. In contrast, among the 15 patients with DNSA originating from pharyngotonsillar infections, the peritonsillar space was involved in 14 patients (93%), followed by the parapharyngeal space in 12 patients (80%). These findings reflect the anatomical pathways through which infections spread from the tonsillar and pharyngeal regions to the adjacent deep neck spaces. Previous studies have consistently demonstrated that involvement of multiple neck spaces and gas formation are associated with more advanced disease and a higher risk of complications [2,9,19,20]. Multiple-space involvement has also been identified as an independent predictor of mortality, and elderly patients are more likely to present with extensive multiple-space disease than younger patients [21]. Therefore, patients with DNSA involving multiple neck spaces should be considered at high risk for severe disease and complications.

In the present study, laryngeal edema associated with DNSA was evaluated using a laryngeal edema score based on the degree of swelling of the epiglottis and arytenoids. In a study by Tanaka et al., patients with acute epiglottitis who presented with severe dyspnea or required tracheostomy had laryngeal edema scores of 4 or 5, whereas none of the patients with a score of < 3 required airway intervention [6]. Similarly, Iwata et al. demonstrated that laryngeal edema score ⩾ 3 was a significant risk factor for difficult tracheal intubation in patients with DNSA [4]. We performed tracheostomy in 11 patients (11%) with laryngeal edema scores of 3, 4, or 5. Therefore, our therapeutic strategy of performing tracheostomy in patients with laryngeal edema scores ⩾ 3 should be beneficial for preventing airway obstruction.

The overall tracheostomy rate in our cohort was consistent with previous reports, which described tracheostomy rates of approximately 10% to 14% in patients with DNSA [2,4,22]. Three of the 11 patients requiring tracheostomy were judged to have difficult orotracheal intubation because of severe trismus or critical laryngeal edema, and these patients underwent tracheostomy under local anesthesia. The remaining eight patients underwent tracheostomy under general anesthesia following successful orotracheal intubation with video laryngoscopy. Preventive tracheostomy under general anesthesia may be safer for restoring airway control and may cause less suffering for patients. However, the optimal method of airway management remains controversial. Although tracheostomy may be associated with complications such as bleeding, temporary impairment of speech and swallowing, and cervical scarring, prolonged endotracheal intubation also has important disadvantages, including the need for sedation and mechanical ventilation, delayed transfer from the intensive care unit, prolonged hospital stay, and increased healthcare costs [23].

The objectives of surgical drainage are not only to evacuate the purulent material but also to oxygenate tissues within the infected spaces, thereby preventing serious complications [15,24]. In clinical practice, abscesses ⩾ 20 mm are generally considered candidates for external surgical drainage, whereas small abscesses may respond to conservative treatment with antibiotics alone [25]. In the present study, we complied with the rule of abscesses ⩾ 20 mm in size for external surgical incision. After evacuation of

purulent material, the abscess cavity was thoroughly irrigated with saline. The choice of surgical approach (transoral, transcervical, or combined) was determined based on the anatomical location of the abscess and its relationship with the oral cavity and cervical structures, highlighting the importance of preoperative imaging in surgical planning. Among 34 patients with odontogenic DNSA, 12 (35%) underwent simultaneous intraoral and external cervical drainage. Similarly, nine of the 11 patients (82%) with DNSA originating from peritonsillar abscesses underwent concurrent transoral peritonsillar incision and drainage. These combined approaches facilitate a more complete evacuation of purulent material and improve infection control.

Bacterial growth was detected in 53% of patients in the present study. The most frequently isolated pathogen in the present study was *α-Streptococcus*, which was identified in 25% of patients. This finding is consistent with those of previous reports on patients with DNSA [26]. Odontogenic DNSA is typically polymicrobial and commonly involves oral *Streptococcus*, anaerobic bacteria, and occasionally *Staphylococcus* species [12]. In contrast, DNSA originating from pharyngotonsillar infections is most commonly associated with *Streptococcus pyogenes*, *Staphylococcus aureus*, and respiratory anaerobes [20]. In the present study, conventional aerobic culture using swab specimens was performed, and no specialized culture techniques were used to isolate anaerobic bacteria. Consequently, anaerobic bacteria were identified in only one specimen. Prompt initiation of empirical broad-spectrum intravenous antibiotic treatment is essential. Antibiotic regimens should provide adequate coverage against both aerobic and anaerobic pathogens and may include agents such as penicillin-based antibiotics, CTRX, and CLDM [14].

The median length of hospital stay for patients with DNSA in the present study was seven days. Previous studies have reported a mean hospital stay of 10.4 to 16.3 days [22,27,28]. The relatively shorter hospital stay observed in our cohort may reflect a prompt diagnosis and early surgical intervention. Previous studies have identified several risk factors for a prolonged hospital stay in patients with DNSA, including advanced age [10,29], DM [8,10,19,27], non-odontogenic infection [19], elevated WBC counts [19], increased CRP levels [17,18], tracheostomy [7], and the need for combined medical and surgical treatment [19]. In the present study, severe disease, characterized by older age, elevated inflammatory markers, gas formation, larger abscess size, and involvement of multiple deep neck spaces, was associated with longer duration of hospital stay. These findings emphasize the importance of early disease severity assessment using clinical, laboratory, imaging, and endoscopic findings to facilitate timely intervention and optimize patient outcome. Furthermore, successful management of DNSA requires close multidisciplinary collaboration among otolaryngologists, dentists, and anesthesiologists to ensure appropriate surgical drainage, airway management, and antimicrobial therapy.

Limitations and future directions

This study has several limitations. First, it was a retrospective analysis conducted at a single center, which may have introduced selection bias and resulted in incomplete or missing clinical data. Second, because our hospital is a tertiary referral center for head and neck diseases, patients with more severe or complicated DNSA were more likely to be referred to it, potentially limiting the generalizability of our findings. Third, the study period was relatively long, and the absence of a strictly standardized treatment protocol throughout this period may have influenced the observed outcomes. Therefore, comparisons between clinical factors should be interpreted cautiously. Future prospective multicenter studies with standardized treatment protocols are warranted to validate our findings and further clarify the outcomes and optimal management strategies for DNSA.

Conclusions

A severe condition, characterized by advanced age, elevated inflammatory markers, gas formation, larger abscess size, and involvement of multiple deep neck spaces, was associated with the need for tracheostomy and a prolonged hospital stay. Accurate diagnosis based on laboratory data, CECT findings, and laryngeal fiberoptic examination, followed by prompt treatment with surgical drainage and, when necessary, tracheostomy, may help achieve favorable clinical outcomes in patients with DNSA.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Ethics Committee of Hokuto Hospital issued approval 1125. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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