Deep Neck Infection in Adults: Factors Associated with Complicated Treatment Outcomes

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Objective: *1) describe clinical characteristics of deep neck infection (DNI) and 2) evaluate associations between clinical risk-factors and complicated treatment outcomes of DNI in adults.*

Material and Method: *Eighty-nine consecutive medical records of DNI patients, older than 18 years of age, at a university hospital between January, 2009 and December, 2015 were retrospectively reviewed. Studied clinical data were collected and recorded. Descriptive statistics were reported as mean, frequency or percentage. Analytical statistics (Fisher's exact test and Odds ratio) were used to identify associations between categorical variables.*

Results: *Patients' ages ranged between 22-89 years (mean of 51.3 $\pm$ 16.6 years). Diabetes mellitus was the most common comorbidity (31.5%). Dental origin was the most common etiology (60.7%). Streptococcus viridans group was the most common causative organism (27.8%), followed by Burkholderia pseudomallei (22.2%). Surgical drainage was performed in 70.2% of cases. Among all complications (22.5%), airway obstruction was the most common (15.7%). Co-morbidities, Dyspnea, fever, retropharyngeal DNI, visceral-vascular space DNI, multiple space DNI, need for surgical drainage, and prolonged hospitalization were significantly associated with complications. Fever, visceral-vascular space, multiple space DNI and prolonged hospital stays were significantly associated with surgery required DNI. Parapharyngeal, retropharyngeal, visceral-vascular spaces and prolonged hospital stays were significantly related to multiple space DNI. The respective risks for complications and multiple space involvement in melioidosis DNI patients were 2.44-fold and 2.28-fold higher than those of other DNI patients*

Conclusion: *Complicated treatment outcomes of DNI in adults including complications, need for surgical drainage and prolonged hospitalization had significant associations with comorbidities, fever, dyspnea, multiple space DNI, parapharyngeal, retropharyngeal DNI and visceral-vascular spaceDNI. Melioidosis should be suspected in cases of severe DNI, especially if patients originating from or returning from travel in endemic areas*

Keywords: *Deep neck infection, Complications, Risk factors, Treatment, Adult*

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Deep neck infection (DNI) is defined as infection in the deep fascia enclosed potential space of the neck. While the advent of antibiotics has significantly diminished the incidence of DNI[1], this infection is still life threatening and may be fatal due to the risk of severe complications including descending necrotizing mediastinitis[2], septic shock, pneumonia[1], internal jugular vein thrombosis[3] and infectious arteritis[4] or rupture[5] of carotid artery. Early accurate diagnosis of DNI is challenging because of complex head and neck anatomy, deep seated space location, variety of etiologies and non-dominant signs-symptoms, necessitating high index of suspicion to avoid any delay in treatment[6]. This condition can affect all age groups[1,7-9]. The causes of DNI in children and adults are different. Pharyngotonsillar infection and lymphadenitis are dominant source of pediatric DNI[8] while odontogenic infection is the main cause of DNI in adults[10,11]. A predilection for space involvement also differs between the two groups[12]. Treatment of DNI in children tends to be more conservative than in adults[13,14]. Diagnosis and treatment of DNI in adults may be more complicated, requiring more surgical treatment than in children because adults, especially the elderly, are prone to comorbid diseases[15-17]. There are limited data of DNI in adults regarding clinical risk factors. Knowledge about clinical risk factors including age, comorbidities, etiology, specific causative organisms, location of specific space involvement is crucial for effective treatment and decreased complication rates. The present study aimed (1) to report

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the clinical characteristics, etiology and causative agents, locations of infection, treatments, outcomes and complications and (2) to evaluate clinical factors associated with complicated treatment outcomes of DNI in adults

Material and Method

The present study was a consecutive case series conducted at Srinagarind University Hospital in Northeastern Thailand. The study period was between January 2009 and December 2015. The authors enrolled patients, older than 18 years of age, who were diagnosed with DNI. The specific locations of DNI were classified according to Vieira et al[3]. Patients diagnosed with peritonsillar infection were excluded due to the simple course of treatment required.

Medical records of all eligible patients were reviewed. Demographic data, comorbidities, duration before admission, presenting symptoms, clinical findings, diagnosis, treatments, duration of hospitalization, outcomes and complications were recorded. Descriptive statistics were used to analyze clinical features and reported as frequency or percentage. Continuous or discrete data are reported as mean $\pm$ SD for data with normal distribution or as quartiles for data without normal distribution. The categorical variables were presented as frequencies and percentages. The associations between categorical variables were tested by Fisher's exact test and Odds ratio with 95% confidence interval using SPSS statistics 15.0 software (2 sided P values less than 0.05 were considered as statistically significant). This study reviewed and approved by the Ethics Committee for Human Research, Khon Kaen University (HE591381).

Results

During the study period, there were 118 patients diagnosed with DNI. Twenty-nine patients, diagnosed with peritonsillar abscess, were excluded. In total, 89 patients met the study criteria.

Patient characteristics are illustrated in Table 1.

Adults over 65 were classified as elderly. The elderly group consisted of 21 patients (23.6%). Duration prior to admission ranged between 1-30 days with quartile1, 2, 3 of 3, 4, 7 days, respectively. Forty patients received prior antibiotic treatment (44.9%) and 18 patients (20.2%) experienced delays of more than 7 days prior to admission.

The etiology, space location and treatment of DNI are shown in Table 2.

Table 1. Patients' characteristics (n = 89)

Sex, No. (%)	
Male	58 (65.2)
Female	31 (34.8)
Age, year, $\pm$SD (range)	51.3$\pm$16.60 (22-89)
Co-Morbidities*, No. (%)	45 (50.6)
Diabetes Mellitus	28 (31.5)
Hypertension	19 (21.3)
Others: Heart, asthma, hepatic, chronic kidney and autoimmune diseases	16 (18.0)
Presenting symptoms*, No. (%)	
Swelling	85 (95.5)
Pain	67 (75.3)
Fever	53 (59.6)
Trismus	38 (42.7)
Odynophagia	28 (31.5)
Sore throat	15 (16.9)
Dyspnea	4 (4.5)
Prior antibiotic treatment, No. (%)	40 (44.9)
Duration prior to admission, Days, Quartile 1/2/3	3/4/7
Duration prior to admission > 7 Days, No. (%)	18 (20.2%)

* One patient may be included in more than one subcategory

Conservative treatment included emergency management, intravenous antibiotic treatment, supportive treatment for symptoms, correction of fluid-electrolyte imbalance and co-morbidity control and treatment of identified etiology of DNI such as dental treatment. Regarding causative agents, aerobic cultures identified only 18 organisms out of 57 (31.6%) specimens. *Streptococcus viridans* group, *Burkholderia pseudomallei*, *Klebsiella pneumoniae*, *Gr A beta-hemolytic streptococci*, *alpha hemolytic streptococcus*, *Staphylococcus aureus* and methicillin resistant *Staphylococcus aureus* were identified in 5, 4, 4, 2, 1, 1, 1 specimens, respectively.

Infection caused by *Burkholderia pseudomallei* also known as "melioidosis". Meliodosis is endemic to Southeast Asia, Northern Australia and Northeastern Thailand. This particular organism is a rare causative agent of DNI. The clinical characteristics of melioidosis presented as DNI were shown in Table 3.

Positive cultures were achieved from pus specimens in first 4 cases. The last case was diagnosed with melioidosis by a blood serologic test with a very high melioid titer of 1: 5,840 (normal value: 1: 80). Treatment was continued at home with tetracycline and

Table 2. The etiology, space location, treatment (n = 89)

Etiology, No. (%)	
Dental origin	54 (60.7)
Unknown origin	17 (19.1)
Salivary origin	17 (19.1)
Pharyngotonsillar origin	1 (1.1)
Space location*, No. (%)	
Submandibular space	33 (37.1)
Submaxillary space	32 (36.0)
Sublingual space	8 (9.0%)
Parapharyngeal space	22 (24.7)
Masticator space	17 (19.1)
Masseter space	12 (13.5)
Pterygomandibular space	8 (9.0)
Temporal space	2 (2.2)
Retropharyngeal space	14 (15.7)
Visceral-vascular space*	13 (14.6)
Visceral space	12 (13.5)
Vascular space	3 (3.4)
Parotid space	14 (15.7)
Buccal space	7 (7.9)
Canine space	2 (2.2)
Multiple space involvement, No. (%)	21 (23.6)
Treatment	
Conservative treatment	25 (28.1)
Surgical treatment	64 (71.9)
Hospital stay, days, Q 1/2/3	5/7/13

* One patient may be included in more than one subcategory

trimethoprim-sulfamethoxazole for 10-20 weeks in all cases. The hospital stays ranged from 8 to 51 days with quartile 1, 2, 3 of 10, 14, 41 days.

The remaining 38 specimens (73.1%) were reported as no growth. No anaerobic culture was performed in the present case series. The most prescribed empirical antibiotic regimen was a combination of anaerobic organisms covering antibiotics (clindamycin: 63, 75% of cases or amoxicillin plus clavulanic acid: 25, 29.8% of cases) and broad spectrum aerobes covering antibiotics (ceftazidime: 35, 41.7% of cases). The minority of antibiotics used were ceftriaxone, penicillin g sodium and metronidazole.

For radiological evaluation, head and neck soft tissue plain film and computed tomography were performed on 8 patients (8.9%) and 18 patients (20.2%) respectively. Surgical treatment was performed under general anesthesia in operative room through external approach in most of the surgical cases (61, 95.3%). Only 3 cases (4.7%) were drained intraorally with local anesthesia. Among 64 patients who underwent surgical drainage, 60 (93.8%) were positive for purulent

Table 3. Clinical characteristics of deep neck Infection patients caused by *Burkholderia pseudomallei* (n = 5)

Age	Sex	Underlying disease	Predisposing factor	Duration before admission (days)	Space involvement	Antibiotic treatment	Number of surgical drainage	Complications	Hospital stay (days)
41	Male	DM	Tooth extraction	21	Submandibular space	Amoxicillin+ Clavulanic acid, Ceftazidime	1	None	13
57	Male	DMAsthma	Tooth extraction	6	Masseteric, temporal spaces	Clindamycin, Ceftazidime	3	Panopthalmitis Pneumonia, Sepsis	31
52	Male	DM	None	3	Ludwig angina, parapharyngeal, retropharyngeal, visceral-vascular spaces	Clindamycin, Ceftazidime, Meropenam	3	Tracheostomy Mechanical ventilator Pleural effusion Pericardial effusion Mediastinitis	51
48	Female	DM	None	45	Parotid space	Clindamycin, Ceftazidime	1	None	8
29	Male	None	None	30	Parotid space	Amoxicillin+ Clavulanic acid, Ceftazidime	1	None	14

discharge intraoperatively, while 4 (6.2%) were negative for purulent discharge. Duration from admission to surgical intervention ranged between 1 and 240 hours with quartile 1, 2, 3 of 3, 7.5, 24.5 hours respectively. Hospital stay ranged between 1 and 31 days.

The overall rate of complications of DNI was 22.5%. Airway obstruction was the most common (15.7%), followed by mediastinitis (6.7%). Other complications included pneumonia (5.6%), septicemia (4.5%), pleural effusion (3.4%) and others-cardiac arrest, pericardial effusion, vocal cord palsy, pharyngocutaneous fistula- (5.6%).

Statistical analysis for evaluation of associations between presence of complications and clinical factors including age, sex, co-morbidity, DM, other underlying disease, etiology, signs-symptoms, specific location of DNI, prior antibiotic treatment, hospital stays, etcetera were performed and showed no statistical significance. The significant associations and some interesting clinical associations are illustrated in Table 4.

Associations between rates of overall comorbidities, specific comorbidity and age groups were shown in Table 5.

DNI with multiple spaces involved were found in 21 patients (23.6%). Statistical analysis for evaluation of associations between multiple space involvement and clinical factors including age, sex, co-morbidity, DM, other underlying disease, etiology, signs-symptoms, specific location of DNI, prior antibiotic treatment, hospital stays, etcetera were performed and showed no statistical significance. The significant associations and some interesting clinical associations are illustrated in Table 6.

Bivariate statistical analysis of associations between the need of surgical treatment and all clinical factors including age, sex, co-morbidity, DM, other underlying disease, etiology, signs-symptoms, specific location of DNI, prior antibiotic treatment, hospital stays, etcetera were performed and showed no statistical significance The significant associations and some interesting clinical associations are illustrated in Table 7.

Discussion

This case series study was conducted at the referral center in Northeast of Thailand using data collected over a 6-year-period. Despite the decreased rate of DNI due to the development of antibiotics[1], it still can cause significant morbidity or even fatality[2]. The rate of complications in the present study was 22.5% which was in the range of 4.5-33.7% reported by

Table 4. Associations between clinical factors and presence of complications (n = 89)

Categories	Presence of complications		*p*-value (2 sided) by Fisher's exact test	Odds ratio (95% CI)
	Yes (n = 20)	No (n = 69)		
	No. (%)	No. (%)		
Age >65	8 (40.0)	13 (18.8)	0.072	2.87 (0.98-8.45)
Co-morbidities (all)	16 (80.0)	29 (42.0)	0.004*	5.52 (1.67-18.23)
Diabetes mellitus	12 (60.0)	16 (23.2)	0.005*	4.97 (1.73-14.27)
Fever	16 (80.0)	37 (53.6)	0.041*	3.46 (1.05-11.41)
Dyspnea	4 (20.0)	0 (0)	0.002*	NA
Melioidosis deep neck infection	2 (10.0)	3 (4.3)	0.313	2.44 (0.38-15.76)
Parapharyngeal space	9 (45.0)	13 (18.8)	0.036*	3.52 (1.21-10.25)
Retropharyngeal space	9 (45.0)	5 (7.2)	0.000*	10.47 (2.95-37.17)
Visceral-vascular space	7 (35.0)	6 (8.7)	0.008*	5.65 (1.63-19.60)
Parotid space	0 (0)	14 (20.3)	0.033*	NA
Multiple space involvement	14 (70.0)	7 (10.1)	0.000*	20.67 (6.01-71.06)
Surgical treatment	19 (95.0)	45 (65.2)	0.010*	10.13 (1.28-80.39)
Prior antibiotic treatment	8 (40.32)	30 (46.4)	0.799	0.77 (0.28-2.12)
Duration until admission >7 days	3 (15.0)	15 (21.71)	0.753	0.64 (0.16-2.46)
Hospital stay >10 days	16 (80.0)	11 (15.9)	0.000*	21.09 (5.92-75.19)

* Statistically significant

NA = Not available, cannot be calculated because variables were o or 100%; CI = confidence interval

Table 5. Associations between co-morbidities and age groups (n = 89)

	Elderly, n = 21	Younger adults, n = 68	*p*-value (2 sided) by Fisher's exact test	Odds ratio (95% CI)
	No. (%)	No. (%)		
Co-morbidity (No.)				
Diabetes Mellitus, (28)	8 (38.0)	20 (29.4)	0.572	1.48 (0.53-4.11)
Hypertension, (19)	9 (42.9)	10 (14.7)	0.012 *	4.35 (1.46-12.99)
Others, (16): (Heart, asthma, hepatic, chronic kidney and autoimmune diseases	6 (28.6)	10 (14.7)	0.193	2.32 (0.73-7.40)

* Statistically significant, CI = confidence interval

Table 6. Associations between clinical factors and multiple space involvement (n = 89)

Categories	Presence of multiple space involvement		*p*-value (2 sided) by Fisher's exact test	Odds ratio (95% CI)
	Yes (n = 21)	No (n = 68)		
	No. (%)	No. (%)		
Melioidosis Deep Neck Infection	2 (9.5)	3 (4.4)	0.588	2.28 (0.36-14.66)
Fever	19 (90.5)	34 (50)	0.001*	9.5 (2.05-43.99)
Parapharyngeal space	12 (63)	9 (13.8)	0.000*	10.67 (3.32-34.30)
Retropharyngeal space	9 (47.4)	4 (6.2)	0.000*	13.73 (3.54-53.18)
Visceral-vascular space	11 (57.9)	1 (1.5)	0.000*	88 (9.99-774.64)
Hospital stay>10 days	17 (81)	10 (14.7)	0.000*	24.65 (6.86-88.59)

* Statistically significant, CI = confidence interval

Table 7. Associations between clinical factors and surgical treatments (n = 89)

Clinical characteristics	Surgical treatment		*p*-value (2 sided)by Fisher's exact test	Odds ratio (95% CI)
	Yes (n = 64)	No (n = 25)		
	no. (%)	no. (%)		
Melioid Deep Neck Infection	5 (7.8)	0 (0.0)	0.316	NA
Multiple space involvement	20 (31.3)	1 (4.0)	0.005*	10.91 (1.38-86.37)
Visceral-vascular space involvement	13 (20.3)	0 (0.0)	0.016*	NA
Fever	43 (67.2)	10 (40.0)	0.030*	3.07 (1.18-7.98)
Hospital stay >10 days	25 (39.1)	2 (8.0)	0.004*	7.37 (1.59-34.03)

* Statistically significant, NA = Not available, cannot be calculated because variables were o or 100%, CI = confidence interval

other studies[6,7,11,15-18]. DNI can affect all age groups. Since the overall population ages gradually, DNI in adults appears to be more prevalent and challenging due to an increased risk for development of co-morbidity, especially in elderly[19]. A study by Chi T-H et al[6], comprising a proportion of the elderly of 21.6%,

reported that the significant risk factors for increased complication rate were being elderly and having comorbidities. The present study with a comparable elderly proportion (23.6%) also showed an increased rate of complications in the elderly group but the statistics were not significant (Table 4). This may be explained by that the percentage of the DM among both the elderly and younger adult group in the present study was not statistically significant (Table 5). However, in the reference study, there was a significant greater percentage of DM in the elderly group (46.9% vs. 15.5%, $p<0.001$). Regardless of age comparison, the authors noted that the presence of overall co-morbidities in adults was significantly related to the presence of complications (Table 4). When subgroups of comorbidities were analyzed, the authors found that patients with underlying DM were significantly related to the presence of complications in DNI patients (Table 4). Some studies supported that DM was a key risk factor for complicated DNI[10,16,20,21]. In DM patients, hyperglycemia may impair several mechanisms of humoral host defense, such as varied neutrophil function: adhesion, chemotaxis and phagocytosis and thus increase the severity of infection[22]. Regarding signs and symptoms (Table 1), swelling (95.5%) and pain (75.3%) were the most common presenting signs and symptoms in the present study which were comparable to those (painful swelling: 92.0%). of another study[23]. In the present study, the authors noted that dyspnea and fever were significantly associated with presence of complications (Table 4). This might seem to be simple findings which physicians can easily get during clinical practice and remind physicians of the possibility of complication developments, if these signs and symptoms exist. In the authors' country, patients can access antibiotic treatment easily at drug stores without a doctor's prescription or at small private clinic before going to hospital. Rate of prior antibiotic treatment in the present study (Table 1) was 44.9%, which was comparable to the rate of 57% reported by a study from China[11]. The present study showed no association between either prior antibiotic treatment or delayed treatment time and presence of complications (Table 4). To prove this, further well designed study with a larger sample size would be required. In the present study, odontogenic origin was the most common cause of DNI (Table 2) which was comparable to other studies[2,6,7,10,16]. This may be the results of poor dental hygiene[17]. Unknown causes, in the present study, was 19.1% (Table 2) within the range of 10.7%-55.4% reported by other studies[6,7,11,16].

DNI are generally polymicrobial infections including aerobic and anaerobic bacteria. The predominant aerobic organisms are *S. aureus* and GABHS[24]. In the present case series, *Streptococcus viridans* group was the most common organism. *Burkholderia pseudomallei* was the second most common aerobic organism. This aerobic gram negative bacilli organism causes an infectious disease known as "melioidosis". The disease is endemic to Southeast Asia, Northern Australia and Northeastern Thailand. The incidence rate in northeast Thailand is reported to be 21.3 cases per 100,000 people per year[25]. Several risk factors for this infection have been reported and include male gender, diabetes, renal failure, thalassemia, alcoholism, chronic lung disease, and steroid use[26,27]. The organisms can be found in soil and water. Humans may get infected by skin contamination or inhalation. This bacterium can infect several organs in humans such as the lungs, liver, spleen, kidneys, skin and soft tissue, joints, or multiple organs, or can result in disseminated infection. The mortality rate in septicemic melioidosis can be as high as 54.17%[27]. There are 2 previous "A case report" of meliodosis associated with deep neck infection. The first was reported one case of meliodosis in parapharyngeal space[28]. The second one was in masticator space[29]. The present study (5 cases) (Table 3) showed that male preponderance (4: 1) and underlying DM (4/5; 80%) are clinical risk factors in accordance with the references mentioned earlier[26,27]. DNI can include submandibular, masticator, parapharyngeal, retropharyngeal, visceral-vascular and parotid spaces. Forty percent of cases had complicated courses. The respective risks for complications and multiple space involvement in melioidosis patients were 2.44 fold and 2.28 fold higher than those of other DNI patients (Table 4, 6). This is not statistically significant; however, this should be proved further by a study with more subjects. Compared to other DNI, melioidosis with DNI had a longer duration of symptoms before admission (median: 4 vs. 21 days) and longer hospitalization (median: 7 vs. 14 days) (Table 1, 2 and Table 3 (text). Global travel is commonplace today and makes this disease occur outside the usual areas. A study[30] reviewed 72 cases of melioidosis in travelers published in the literature and showed that melioidosis in travelers was acquired mostly in Thailand (46% of cases). Clinical findings demonstrated that sepsis was the most common (34%) followed by pneumonia (29%). Melioidosis often mimics other diseases (other community-acquired pneumonias and tuberculosis),

resulting in possible misdiagnosis of the condition. For these reasons, melioidosis is often referred to as the "Great Mimicker"[31]. The present study might increase awareness of deep neck space infection caused by melioidosis. Familiarity with this form of disease might be helpful to treat effectively. The possibility of melioidosis should be considered not only in patients originating from endemic areas, but also in patients returning from travel in those regions.

About all cases of DNI in the present study, submandibular space was the most common site of infection (37.1%) (Table 2), which was similar to others[7,16]. Concerning associations among specific location of DNI, multiple spaces involvement, the need of surgical treatment and complications, there was a report[32] suggesting that parapharyngeal space DNI is more likely related to multiple space involvement. This may be explained by the fact that this space is a central space in the deep neck and has close relations to other spaces[33]. Visceral vascular space has its proximity to vital structures[3] including the carotid artery, internal jugular vein, cranial nerves, it can pose significant risk of complications including carotid artery injury[34], jugular vein thrombophlebitis[35,36]. One study[14] showed that retropharyngeal space DNI is related to severe infection with mediastinal extension and needs both cervical and mediastinal drainage in 100% of cases. Several studies[10,13,14,32,37] reported that multiple space involvement are frequently related to complicated outcomes and need more aggressive surgical treatment. In the present study, the authors found that parapharyngeal space; retropharyngeal space and visceral-vascular space do not only relate to the occurrence of multiple space involvement (Table 6) but also have an association with the presence of complications (Table 4). Multiple spaces DNI had significant association with presence of complications (Table 4) and need of surgical drainage (Table 7). Visceral-vascular space DNI was related to the need of surgical drainage significantly (surgical drainage were required in all cases) (Table 7). The rate of surgical drainage for treatment of DNI in the present study was 70.2% in accordance with those (56%-82%) of other studies[10,20,32]. Several factors possibly related to the need of surgical drainage in treatment of DNI included multiple spaces involvement[32,37], underlying diabetes mellitus[20,38] and presence of fever[37]. In addition to multiple spaces involvement mentioned earlier, the authors also found that the surgically drained cases of DNI were significantly associated with fever (Table 7). In addition, the authors also found that DNI with complications were significantly associated with the need of surgical drainage (Table 4). Concerning specific space infection and surgery, only visceral-vascular space was associated with the need of surgical drainage (Table 7). Regarding prolonged hospitalization, there were suggestive risk factors including comorbidities[10,39], multiple space involvement[13], complications[10,13,39] and need of surgical drainage[39]. In the present study, the authors found that prolonged hospitalization was related to DNI with complications (Table 4) and DNI with surgical drainage (Table 7). Limitations of the present study were the small number of reported cases and being a retrospective study. Statistical analysis can only be performed by bivariate analysis. Multivariate analysis by further studies with adequate amount of cases might be necessary.

Conclusion

Deep neck infection in adults posed a significant rate of complications. Complicated treatment outcome of deep neck infection in adults including complications, need of surgical drainage and prolonged hospitalization had statistically significant associations with co-morbidities, fever, dyspnea, multiple space involvement. Parapharyngeal, retropharyngeal and visceral-vascular space were significantly related to multiple space deep neck infection. For specific location, only visceral-vascular space was associated with need of surgical drainage significantly ($p = 0.016$). Melioidosis should be suspected in severe forms of deep neck infection, especially in patients originating from or returning from travel in endemic areas.

What is already known on this topic?

Despite the decreased rate of DNI due to the development of antibiotics, it still can cause significant morbidity and complicated outcomes of treatment. Knowledge about clinical risk factors for complicated outcomes of DNI treatment is crucial for effective treatment and decreased complication rates. Although Some of this risk factors including the elderly[6], comorbidities[16], multiple space involvement[37] have been reported, but data on other risk factors still be lacking especially for DNI in adults.

What this study adds?

This study adds other potential risk factors including fever, dyspnea, specific location of DNI (parapharyngeal, retropharyngeal and visceral-vascular space), specific organisms (Burkholderia

pseudomallei) to be taken into consideration, hoping that this would help improve treatment outcome of this condition.

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Potential conflict of interest

None.

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การติดเชื้อชั้นลึกของคอในผู้ใหญ่: ปัจจัยที่สัมพันธ์กับผลการรักษาที่ซับซ้อน

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วัตถุประสงค์: *1) บรรยายลักษณะทางคลินิกของการติดเชื้อชั้นลึกของคอ 2) ประเมินความสัมพันธ์ระหว่างปัจจัยเสี่ยง ทางคลินิกและผลการรักษาที่ซับซ้อนของการติดเชื้อชั้นลึกของคอในผู้ใหญ่*

วัสดุและวิธีการ: *89 เวชระเบียนที่ต่อเนื่องตามลำดับของผู้ป่วยติดเชื้อชั้นลึกของคอที่อายุมากกว่า 18 ปี ณ โรงพยาบาลมหาวิทยาลัยแห่งหนึ่ง ระหว่างเดือนมกราคม พ.ศ. 2552 ถึงเดือนธันวาคม พ.ศ. 2558 ถูกศึกษาย้อนหลัง ข้อมูลที่สนใจศึกษาถูกเก็บรวบรวมและบันทึก สถิติพรรณาถูกรายงานเป็นค่าเฉลี่ย ความถี่ หรือค่าร้อยละ สถิติเชิงวิเคราะห์ (Fisher's exact และ Odds ratio) ถูกใช้ระบุความสัมพันธ์ระหว่างตัวแปรที่จำแนกเป็นกลุ่ม*

ผลการศึกษา: *อายุของผู้ป่วยมีช่วง 22-89 ปี (51.3±16.6) เบาหวานเป็นโรคร่วมที่พบมากที่สุด (31.5%) ต้นกำเนิดจากฟันเป็นสาเหตุที่มากที่สุด (60.7%) เชื้อกลุ่ม Streptococcus viridans เป็นเชื้อสาเหตุที่มากที่สุด (27.8%) ตามมาด้วยเชื้อ Burkholderia pseudomallei (22.2%) การผ่าตัดระบายหนองถูกกระทำใน 70.2% ของผู้ป่วย ในบรรดาภาวะแทรกซ้อนทั้งหมด (22.5%) ทางเดินหายใจอุดกั้นเป็นภาวะแทรกซ้อนที่พบมากที่สุด (15.7%). โรคร่วม, อาการหายใจลำบาก, ไข้, การติดเชื้อชั้นลึกของคอช่องหลังคอหอย, การติดเชื้อชั้นลึกของคอช่อง visceral-vascular, การติดเชื้อชั้นลึก ของคอหลายช่อง, การที่ต้องได้รับการผ่าระบายหนองและการนอนโรงพยาบาลนานมีความสัมพันธ์ อย่างมีนัยสำคัญกับภาวะแทรกซ้อน. ไข้, การติดเชื้อ ชั้นลึกของคอช่อง visceral-vascular, การติดเชื้อชั้นลึกของคอหลายช่อง และการนอนโรงพยาบาลนานสัมพันธ์อย่างมีนัยสำคัญกับผู้ป่วยติดเชื้อชั้นลึกของคอที่ต้องได้รับการผ่าตัดระบายหนอง. การติดเชื้อชั้นลึกของคอช่องข้างคอหอย, การติดเชื้อชั้นลึกของคอช่องหลังคอหอย, การติดเชื้อชั้นลึกของคอช่อง visceral-vascular และการนอนโรงพยาบาลนานสัมพันธ์อย่างมีนัยสำคัญกับการติดเชื้อชั้นลึกของคอหลายช่อง. ความเสี่ยงสำหรับภาวะแทรกซ้อนและความเสี่ยงสำหรับการติดเชื้อชั้นลึกของคอหลายช่องในคนไข้ติดเชื้อชั้นลึกของคอจาก melioidosis สูงกว่าในคนไข้ติดเชื้อชั้นลึกของคอชนิดอื่น 2.24 และ 2.28 เท่าตามลำดับ*

สรุป: *ผลการรักษาที่ซับซ้อนของการติดเชื้อชั้นลึกของคอในผู้ใหญ่ ซึ่งประกอบด้วย ภาวะแทรกซ้อน, ความต้องการผ่าตัดระบายหนอง, การนอนโรงพยาบาลนาน มีความสัมพันธ์อย่างมีนัยสำคัญกับโรคร่วม, ไข้, อาการหายใจลำบาก, การติดเชื้อชั้นลึกของคอหลายช่อง, การติดเชื้อชั้นลึกช่องข้างคอหอย, การติดเชื้อชั้นลึกของคอช่องหลังคอหอย และการติดเชื้อชั้นลึกของคอช่อง visceral-vascular. การติดเชื้อชั้นลึกของคอจาก melioidosis ควรถูกสงสัยในกรณีของการติดเชื้อชั้นลึกของคอที่รุนแรง โดยเฉพาะถ้าผู้ป่วยมีต้นกำเนิดจากเขตถิ่นระบาดหรือกลับมาจากการเดินทางไปถิ่นระบาด*