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Risk Factors in Descending Necrotizing Mediastinitis Following Submandibular Abscess at dr. Cipto Mangunkusumo Hospital in January 2012 – July 2016

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Abstract

Introduction. Descending necrotizing mediastinitis (DNM) encountered problem of a high mortality rate. The increasing number of incidence and the need of immediate intervention DNM cases urge surgeons to manage early preventions and adequate therapy. The purpose of this study is to find risk factors that correlate to the incidence of DNM in submandibular abscess patients.

Method. Cross sectional study conducted enrolling all patients diagnosed with submandibular abscess that developed to DNM and treated surgically in emergency operating theater in period of January 2012 to July 2016 were reviewed. Mediastinitis which was not following submandibular abscess, those were not treated surgically or treated by other than the division of thoracic and cardiovascular surgery, and those of pediatrics were not included on the study. The incidence of DNM was the dependent variable on the study; risk factors such as gender, age, body mass index (BMI), comorbid(s), leukocyte counts, and microorganism(s) were independent variables on the study.

Results. There were 68 subjects enrolled on the study. The met the inclusion and exclusion criteria. Subjects characteristics are shown in table 1. Septic condition, surgical intervention, postoperative complications, and mortality are shown in table 2. There was no correlation between gender ($p = 0.656$), age ($p = 0.763$), comorbid(s) ($p = 0.767$ and 0.952). It also found that leukocyte counts, and cultured microorganism(s) showed no significant correlation.

Conclusion. Not a single risk factor specifically correlates to the incidence of DNM in subjects with submandibular abscess. Thus, so those with submandibular abscess have a same risk to have DNM developed.

Keywords: *descending necrotizing mediastinitis, submandibular abscess, risk factors.*

Introduction

Submandibular abscess is a condition of a great potential to develop as mediastinitis. The problem is serious one as it developed to a necrotic fascia in collar region extending to mediastinal fascia known as descending necrotizing mediastinitis (DNM). DNM may lead to sepsis with a high mortality rate as much as 40% even in those adequately treated.¹ Thus, DNM should be detected and appropriately managed on the early date.

At dr. Cipto Mangunkusumo General Hospital (RSCM) during period of January 2012 to June 2014 there were 16 cases reported and tend to increase.² Early detection is essential due to nature of a disease which is developed progressively. Risk factors which is age, gender, comorbidities, leukocyte counts, and invading microorganisms, were influencing the development of DNM following submandibular abscess in RSCM. A study conducted focused on these risk factors to have the points should be noticed in the early detection.

Method

We run a cross sectional study enrolling all patients diagnosed with submandibular abscess that developed to DNM and treated surgically in emergency operating theater in period of January 2012

to July 2016 were reviewed. Mediastinitis which was not following submandibular abscess, those were not treated surgically or treated by other than the division of thoracic and cardiovascular surgery, and those of pediatrics were not included on the study. The incidence of DNM was the dependent variable on the study; risk factors such as gender, age, body mass index (BMI), comorbid(s), leukocyte counts, and microorganism(s) were independent variables on the study. Development of septic condition, surgical intervention, postoperative complication(s) and outcomes were analyzed conclusively. The association or correlation of these variables were analyzed. The committee of ethics, Faculty of Medicine, Universitas Indonesia approved the study 793/UN2.F1/ETIK/2016 and licensed by the research bureau of RSCM LB.02.01/X.2/855/2016.

Results

There were 68 subjects enrolled on the study. The met the inclusion and exclusion criteria. Subjects characteristics are shown in table 1. Septic condition, surgical intervention, postoperative complications, and mortality are shown in table 2. There was no correlation between gender ($p = 0.656$), age ($p = 0.763$), comorbid(s) ($p = 0.767$ and 0.952) as shown in table 3. It also found that leukocyte counts, and cultured microorganism(s) showed no significant correlation.

Table 1. Characteristics of subjects with submandibular abscess

Characteristics	DNM		n (%)
	Yes	No	
Age			
– <40 years	7	13	20 (29.4)
– 40–60 years	14	28	42 (61.8)
– >60 years	1	5	6 (8.8)
Gender			
– Male	16	31	47 (69.1)
– Female	6	15	21 (30.9)
Body mass index			
– <18.5 kg/mm ²	1	4	5 (7.4)
– 18.5–22.9 kg/mm ²	6	10	16 (23.5)
– 23–24.9 kg/mm ²	4	11	15 (22.1)
– >25 kg/mm ²	11	21	32 (47.1)
Comorbid			
– None	12	23	35 (51.5)
– 1 Comorbid	6	15	21 (30.9)
– >1 Comorbid	4	8	12 (17.6)

Table 2. Characteristics of subjects with submandibular abscess (cont.)

Characteristics	DNM		n (%)
	Yes	No	
Leukocyte counts			
– <15,000 cell/μL	5	17	22 (32.4)
– 15,001–20,000 cell/μL	10	13	23 (33.8)
– 20,001–25,000 cell/μL	3	10	13 (19.1)
– >25,000 cell/μL	4	6	10 (14.7)
Microorganism culture			
– Sterile	2	6	8 (11.8)
– 1 Microorganism	11	31	42 (61.8)
– >1 Microorganisms	9	9	18 (26.5)

Table 3. Sepsis and Surgical intervention

Variables	DNM		n (%)
	Yes	No	
Sepsis			
– Yes	20	27	47 (69.1)
– No	2	19	21 (30.9)
Operation			
– Cervicotomy	0	46	46 (67.6)
– Cervicotomy + Stenotomy	22	0	22 (32.4)
Re-operation			
– Yes	4	8	12 (17.6)
– No	18	38	56 (82.4)
Complication			
– Yes	18	9	27 (39.7)
– No	4	37	41 (60.3)
Postoperative Complications			
– Pneumonia	9	4	13 (19.1)
– Sepsis	9	5	14 (20.6)
– None	4	37	41 (60.3)
Mortality			
– Yes	9	7	16 (23.5)
– No	13	39	52 (76.5)

Table 4. Risk factors associated with DNM

Variables		DNM		Total	OR	95% CI	p
		Yes	No				
Gender	Male	16 (34%)	31 (66%)	47	0.775	0.252–2.382	0.656
	Female	6 (28.6%)	15 (71.4)	21			
Age	<40 years	7 (35%)	13 (65%)	20	1.185	0.393–3.570	0.763
	≥40 years	15 (31.3%)	33 (68.8%)	48			
Comorbid	None	12 (34.3%)	23 (65.7%)	35	1	1	1
	1	6 (28.6%)	15 (71.4%)	21	0.958	0.236–2.486	0.767
	>1	4 (33.3%)	8 (66.7%)	12	0.767	0.239–3.841	0.952
	No	16 (36.4%)	28 (63.6%)	44	–	–	–
Leukocyte counts (cells/μL)	<15,000	5 (22.7%)	17 (77.3%)	22	1	1	1
	15,001–20,000	10 (43.5%)	13 (56.5%)	23	1.487	0.391–5.645	0.560
	>20,000	7 (30.4%)	16 (69.6%)	23	2.615	0.717–9.537	0.145
Microorganism	Not grow	3 (33.3%)	6 (66.7%)	9	1.053	0.237–4.669	1.000*
	Grow	19 (32.3%)	40 (67.8%)	59			

* = Fisher test

Discussion

On the study there were 22 (32.4%) out 68 subjects diagnosed with submandibular abscess developed to DNM. In this study age showed no correlation to DNM, different to the study of Hasegawa (2011) and Palma (2013) showing males tends to have DNM.^{5,9} Other studies on DNM (Boscolo–Rizzo in Europe, 2012, Lee in Korea, 2007, and Ishinaga, Japan 2013) also showed males were predominant though were not significant.^{1,15,16} Another studies by Zheng (China, 2014) and Sumi (Japan, 2013) found that elder

patients over 60 years showed a higher risk to have DNM.^{7,10} In the study, Boscolo–Rizzo found that an increase of 10 years of age associated with the increased risk to have DNM (OR 1.2; 95% CI 1.04–1.39, $p = 0.012$).¹ Other study in Korea (Kang 2012) found that elder as a risk factor to have DNM developed ($p = 0.03$).¹¹ Mathieu in France (1995) found that a risk factors for mortality in DNM was those of age >70 years ($p = 0.03$).¹⁴

There were not a single comorbid showed to have correlation to DNM in this study. This finding was in contrast to study of Mathieu

in France (1995) who found diabetes mellitus is a predisposing factor that increase the risk of mortality in DNM (13.3%; $p = 0.02$).¹⁴ Unlike the study of by Boscolo–Rizzo where submandibular abscess with diabetes mellitus shows a risk of 5.43 times to have DNM developed ($p < 0.001$; 95% CI 2.55–11.53)¹ and Wang (Kaohsiung, Taiwan, 2010) showing submandibular abscess with comorbidities tend to have complex infections (odds ratio 3.96; 95% CI 1.92–8.19, $p = 0.001$).¹² Our finding showed a p value of 0.767. However, our study similar to Ishinaga (2013) and Lee (2007).^{15,16}

In the study we found leukocyte counts shows no correlation to DNM like Lee and Ishinaga,¹⁵ in contrast to Wang (2010) showing the leukocyte counts above 15,000 cells/uL with the increased risk of DNM¹² and Boscolo–Rizzo ($p = 0.05$).¹

Culture of microorganism shows a finding which is not specific to DNM. In other side, study of Hasegawa and Kang shows a correlation with DNM ($p = 0.02$). In their study isolated microorganism was *Streptococcus* sp,^{9,11} like those of Papalia, Huang, Zheng, Boscolo–Rizzo, and Ishinaga. Our study is like Mathieu; and probably due to the use of antibiotic prophylaxis prior to surgical intervention.¹⁴

Conclusion

In this study we found not a single risk factor specifically correlate to the incidence of DNM in subjects with submandibular abscess. Thus, so those with submandibular abscess have a same risk to have DNM developed. Therefore, an aggressive treatment in submandibular abscesses in the early date is essential.

Disclosure

Author declares there is no conflict of interest in this study.

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