Original Article

Peritonsillar abscess in New Zealand Māori: a retrospective case series

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Background: There are no data around peritonsillar abscess (PTA) in Māori. This study aimed to compare and contrast clinical characteristics, laboratory findings, interventions, and outcomes between Māori and non-Māori patients diagnosed with PTA at Auckland District Health Board (ADHB) Hospitals between January 2006 and June 2016.

Methods: Extraction of all hospital morbidity records belonging to patients who were diagnosed with PTA between January 1, 2006 and June 2016 was performed. Ethnicity was separated into Māori and non-Māori so that outcomes of interest could be investigated. Demographic, clinical, and outcome data were analysed.

Results: There were 158 (9%) Māori and 1615 (91%) non-Māori patients. Māori patients with PTA are more likely to present with a shorter duration of symptoms (P=0.005), have asthma (P<0.001), and be smokers (P<0.001). Māori had more pus at the time of aspiration (P<0.001). The mean white cell count was higher in Māori (P=0.003). The mean neutrophil count was also higher in Māori (P=0.006). Māori are less likely to visit their GP prior to presentation (P<0.001), have a history of recurrent tonsillitis (P<0.001), and be readmitted to hospital (P<0.001).

Conclusions: Well documented differences in health outcomes exist between Māori and non-Māori in New Zealand. This study highlights disparities that exist amongst patients presenting with PTA based on ethnicity. We are hopeful that knowledge of these disparities will raise awareness and result in interventions that reduce inequalities.

Keywords: Peritonsillar abscess (PTA); Māori; ethnicity; disparity; indigenous health

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Introduction

Peritonsillar abscess (PTA) is a collection of pus that occurs in the space between the tonsillar capsule and the superior pharyngeal constrictor muscle (1). It is the most common indication for acute hospital admission in Otolaryngology and the most common deep space neck collection in the head and neck region (1,2). PTA is associated with complications including Lemierre's syndrome, dissemination of infection to adjacent deep spaces of the neck, and systemic sepsis (3).

PTA is assumed to arise from acute tonsillar infection with or without the involvement of Weber's glands, yet the exact pathogenesis of disease is currently unknown (4). Causative organisms include gram-positive rods, gram-negative cocci, and anaerobes (5). In a New Zealand setting, it has been found that the majority of bacterial isolates cultured from PTA are penicillin-sensitive, with group A

streptococcus (GAS) being the most common bacterial isolate (6,7). However, increasingly anaerobes are reported as being implicated in PTA (1). As a result, amoxicillin and clavulanic acid was recently reported as the most common antibiotic prescribed in a major New Zealand hospital (1). While there is some evidence emerging that supports antibiotic therapy alone for the treatment of PTA, aspiration followed by incision and drainage remains the gold standard (1,8).

Māori are overrepresented in many communicable diseases when compared to the rest of the New Zealand population (9,10). There are no data around PTA in Māori. With health inequalities being well understood between Māori and non-Māori in other health conditions, and the potential severe morbidity associated with PTA, there is a need to understand the differences between PTA in Māori and non-Māori populations to guide policy that ensures equitable care.

The aim of this retrospective case series was to compare and contrast clinical characteristics, laboratory findings, interventions, and outcomes between Māori and non-Māori patients diagnosed with PTA at Auckland District Health Board Hospitals between January 2006 and June 2016. We present the following article in accordance with the STROBE reporting checklist (available at https://dx.doi.org/10.21037/ajo-19-59).

Methods

Participant information

Data were obtained for this retrospective study from the Auckland District Health Board (ADHB) Clinical Records Department following national ethics approval (Ethics Number 16/STH/96). Individual consent for this retrospective case series was waived. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Extraction of all hospital morbidity records belonging to patients who were diagnosed with PTA between January 1, 2006, and June 2016 was performed. The International Classification of Disease (ICD) 9 code 475 and ICD 10 code J36 was used to identify patients diagnosed with PTA. Exclusion criteria included patients with a prior history of pharyngeal tumour, prior tonsillectomy, or who underwent an acute tonsillectomy during admission for PTA.

Demographic data, including age, sex, and ethnicity, were collected. Ethnicity was separated into Māori and non-Māori so that outcomes of interest could be investigated. Clinical data that were collected included tobacco use, history of recurrent tonsillitis, asthma, type 2 diabetes mellitus, duration of symptoms prior to admission, antibiotics prescribed in the community, and culture swab prior to admission. Laboratory and radiological investigations performed at the time of admission were reviewed. Outcome data included 30-day readmission rates with associated complications.

Statistical analysis

Patient demographics and clinical characteristics were summarized using descriptive statistics. Univariate analysis was used to assess any potential factors that were associated with 30-day readmission rates. Univariate analysis was used to assess potential factors that were associated with differences in Māori and non-Māori patients. Chi-square tests were performed to assess categorical variables and the Student's *t*-test was performed to assess continuous variables. A two-tailed P value less than 0.05 was regarded as statistically significant. All statistical analyses were performed by IBM SPSS.24 software.

Results

A total of 1,773 patients who were diagnosed with PTA between January 2006 and June 2016 were included in this study. There were 158 (9%) Māori and 1,615 (91%) non-Māori patients. Higher rates of smoking (63.9%), recurrent tonsillitis (13.3%) and asthma (51.9%) were observed in Māori relative to non-Māori in this cohort (P<0.001). Demographic and clinical characteristics are summarised in *Table 1*.

Prior to hospital presentation, Māori patients had symptoms for a mean of 4.2±0.3 days compared with 5.1±0.2 days for non-Māori (P=0.005). Non-Māori patients were more likely to visit their general practitioner (GP) prior to hospital admission (57.3% non-Māori, compared with 35.2% Māori; P<0.001). However, non-Māori patients were not statistically more likely to be prescribed antibiotics prior to hospital admission (43.5% non-Māori, compared with 36.1% Māori; P=0.086). Despite seeing their GP less often prior to admission, Māori were more likely to have a throat swab taken in the community prior to admission (17.1% Māori, compared with 8.2% non-Māori; P<0.001). Of the GAS swabs taken, 23.4% were positive, with no significant differences between Māori and non-Māori (P=0.687).

Table 1 Demographic characteristics and medical comorbidities of subjects in Auckland, New Zealand diagnosed with PTA from 2006 to 2016

Characteristics	Māori (n=158)	Non-Māori (n=1,615)	P value
Gender			
Female	38.6%	40.3%	0.731
Male	61.4%	59.7%	0.601
Mean age (years)	38.7±2.1	36.6±0.7	0.073
Smoke			
Yes	63.9%	25%	<0.001*
History of recurrent tonsillitis			
Yes	13.3%	27.1%	<0.001*
Asthma			
Yes	51.9%	21.5%	<0.001*
Type 2 diabetes			
Yes	3.2%	4.3%	0.486

*, significant values. PTA, peritonsillar abscess.

In hospital, all patients were prescribed antibiotics, and all patients underwent aspiration followed by incision and drainage of the PTA. Māori had more pus at the time of aspiration (mean 4.5±0.4 mL Māori, compared with 3.7±0.1 mL non-Māori; P<0.001). Māori were less likely to have the PTA cavity reopened after repeat clinical examination the following day (15.2% Māori, compared with 26.8% non-Māori; P=0.001).

Māori were less likely to be prescribed topical analgesia (Benzydamine or lignocaine viscus) in hospital (67.9% non-Māori, compared with 48.1% Māori; P<0.001). There was no statistically significant difference in the number of patients who were prescribed a non-steroidal anti-inflammatory drug (NSAID) while in hospital (77.5% non-Māori, compared with 74.1% Māori; P=0.411). All patients in this cohort were prescribed oral paracetamol. Clinical and treatment variables are summarised in *Table 2*.

A full blood count was performed on all patients with PTA. The mean white cell count was higher in Māori [$(15.6\pm0.6)\times10^9$/L Māori, compared with $(14.6\pm0.2)\times10^9$/L non-Māori; P=0.003]. The mean neutrophil count was also higher in Māori [$(12.3\pm0.5)\times10^9$/L Māori, compared with $(11.5\pm0.2)\times10^9$/L non-Māori; P=0.006]. There was no difference in the mean C-reactive protein (CRP) between groups [$(107.9\pm23.2)\times10^9$/L Māori, compared with $(104.5\pm5.7)\times10^9$/L non-Māori; P=0.788]. Radiological investigations were undertaken in 12.7% of Māori and 8.5% of non-Māori (P=0.160). There was no statistical difference in the type of radiological investigation performed by group (P=0.112).

Non-Māori patients were more likely to be readmitted within 30 days of discharge with an associated complication (16.4% non-Māori, compared with 6.3% Māori; P<0.001). Elective tonsillectomy following discharge was performed in 16% of non-Māori patients. However, no Māori patients in this cohort underwent elective tonsillectomy (P<0.001). Univariate analysis identified no significant differences between Māori and non-Māori patients regarding 30-day readmission rates with associated complications (P=0.384).

Discussion

Māori made up approximately 11% and 12% of the population of the Auckland region at the start and end of the study period, respectively, and thus are underrepresented in this study cohort (11). Māori presented to hospital with fewer days of symptoms and more severe disease as determined by aspirated pus, white cell count, and neutrophil count. Māori did see their GP less often than non-Māori prior to presentation. However, there was no statistical difference in antibiotic prescriptions between groups. As antibiotics are the only therapy that may slow or reverse disease progression (12). These findings suggest that the natural history of disease differs, with Māori appearing

Table 2 Clinical and treatment variables of subjects in Auckland, New Zealand diagnosed with PTA from 2006 to 2016

Characteristics	Māori (n=158)	Non-Māori (n=1,615)	P value
Pre-admission			
Mean duration of symptoms (days)	4.2±0.3	5.1±0.2	0.005
General practitioner appointment	35.2%	57.3%	<0.001
Antibiotic prescription	36.1%	43.5%	0.086
GAS throat swab	17.1%	8.2%	<0.001
During admission			
Mean volume of pus aspirated (mL)	4.5±0.4	3.7±0.1	<0.001
Reopening of PTA cavity	15.2%	26.8%	0.001
Topical analgesia	48.1%	67.9%	<0.001
NSAID	74.1%	77.5%	0.411
Radiological investigation	12.7%	8.5%	0.160
Inpatient bloods			
Mean white cell count ($\times10^9$/L)	15.6±0.6	14.6±0.2	0.003*
Mean neutrophil ($\times10^9$/L)	12.3±0.5	11.5±0.2	0.006*
Mean CRP ($\times10^9$/L)	107.9±23.2	104.5±5.7	0.788
Following discharge			
Readmission within 30 days	6.3%	16.4%	<0.001
Elective tonsillectomy	0%	16%	<0.001

*, significant values. PTA, peritonsillar abscess; GAS, group A streptococcus; NSAID, non-steroidal anti-inflammatory drug; CRP, C-reactive protein.

to have a more rapid onset of disease.

Even though Māori were less likely to visit the GP, they were more likely to have a throat swab taken. These swabs are taken to detect GAS. It is likely that the higher number of swabs taken reflects awareness of the high rate of GAS pharyngitis leading to rheumatic fever in Māori (13). To our knowledge, there is no established link between GAS pharyngitis and the development of PTA.

There was no difference in age or gender between groups. Māori were more likely to be active smokers, and this is reflective of general population data in New Zealand (14). Smoking is associated with an increased risk of PTA irrespective of gender and age group (15). Māori had much higher rates of asthma than that of non-Māori in this cohort. This is a widely reported finding for many indigenous population groups around the world, including Māori (16). Such disparities are thought to be driven by a complex range of factors including genetic predisposition, physiological differences, lower socioeconomic status, and social-environmental interactions that impede compliance with treatment regimens (16). It is not known if there is an association between asthma and the development of PTA. However, a recent study found that patients with PTA who had asthma were more likely to be readmitted following inpatient treatment (1). Interestingly, there was no difference in the incidence of type 2 diabetes in this cohort. Lower rates of diabetes mellitus in Māori were also observed in this cohort, relative to the 10.3% prevalence of diabetes mellitus in Māori within the Auckland region (17). This is despite Māori having higher documented rates across all age groups nationwide (18,19).

There was little difference in how patients from both groups were treated once in hospital. All patients received aspiration of the PTA followed by incision and drainage and a course of antibiotics. Māori received less topical analgesia, and this may reflect a difference in pain tolerance. However, there was no difference in prescriptions for oral analgesia. Māori were less likely to require reopening of the

PTA cavity the day following initial treatment. This may be secondary to the larger amount of pus at the time of initial incision and drainage, which generally makes it easier to locate and drain the abscess in its entirety.

Māori were less likely to be readmitted in the 30 days following discharge, despite having more severe disease at the time of admission. This is contradictory to data that suggests PTA patients with more severe disease are more likely to be readmitted (1). It is also contradictory to data from a large retrospective cohort study suggesting Māori had 16% higher odds of 30-day readmission to a New Zealand public hospital after adjusting for all covariates (20). Finally, no Māori patients in this cohort underwent elective tonsillectomy and this likely reflects the lower rate of recurrent tonsillitis amongst Māori in this cohort. The incidence of recurrent tonsillitis in Māori is currently unknown.

Conclusions

Well documented differences in health outcomes exist between Māori and non-Māori in New Zealand (21). This study highlights disparities that exist amongst patients presenting with PTA based on ethnicity. Māori patients with PTA are more likely to present with a shorter duration of symptoms, more severe disease, have asthma, and be smokers. Māori are less likely to visit their GP prior to presentation, have a history of recurrent tonsillitis, and be readmitted to hospital. We are hopeful that knowledge of these disparities will raise awareness and result in interventions that reduce inequalities.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://dx.doi.org/10.21037/ajo-19-59

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://dx.doi.org/10.21037/ajo-19-59). The authors have no conflicts of interest to declare.

Ethical statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Auckland District Health Board (ADHB) of (Ethics Number 16/STH/96) and individual consent for this retrospective case series was waived.

References

1. Johnston J, Stretton M, Mahadevan M, et al. Peritonsillar abscess: A retrospective case series of 1773 patients. Clin Otolaryngol 2018;43:940-4.
2. Rusan M, Klug TE, Ovesen T. An overview of the microbiology of acute ear, nose and throat infections requiring hospitalisation. Eur J Clin Microbiol Infect Dis 2009;28:243-51.
3. Lepelletier D, Pinaud V, Le Conte P, et al. Peritonsillar abscess (PTA): clinical characteristics, microbiology, drug exposures and outcomes of a large multicenter cohort survey of 412 patients hospitalized in 13 French university hospitals. Eur J Clin Microbiol Infect Dis 2016;35:867-73.
4. Klug TE, Rusan M, Fuursted K, et al. Peritonsillar Abscess: Complication of Acute Tonsillitis or Weber's Glands Infection? Otolaryngol Head Neck Surg 2016;155:199-207.
5. Marom T, Cinamon U, Itskoviz D, et al. Changing trends of peritonsillar abscess. Am J Otolaryngol 2010;31:162-7.
6. Macassey E, Dawes PJ. Peritonsillar abscess. N Z Med J 2011;124:10-2.

7. Love RL, Allison R, Chambers ST. Peritonsillar infection in Christchurch 2006-2008: epidemiology and microbiology. N Z Med J 2011;124:16-23.
8. Kodiya AM, Ngamdu YB, Sandabe BM, et al. Management strategies of peritonsillar abscess in the tropics: a survey of surgeons' preference. Indian J Otolaryngol Head Neck Surg 2014;66:127-30.
9. Williamson DA, Zhang J, Ritchie SR, et al. Staphylococcus aureus infections in New Zealand, 2000-2011. Emerg Infect Dis 2014;20:1156-61.
10. Baker MG, Barnard LT, Kvalsvig A, et al. Increasing incidence of serious infectious diseases and inequalities in New Zealand: a national epidemiological study. Lancet 2012;379:1112-9.
11. Aotearoa SNZT. NZ.Stat [Internet]. Statistics NZ Tatauranga Aotearoa. [cited 2021 Sep 20]. Available online: http://nzdotstat.stats.govt.nz/wbos/index.aspx?queryid=796
12. Galioto NJ. Peritonsillar abscess. Am Fam Physician 2017;95:501-6.
13. Shetty A, Mills C, Eggleton K. Primary care management of group A streptococcal pharyngitis in Northland. J Prim Health Care 2014;6:189-94.
14. Blakely T, Disney G, Valeri L, et al. Socioeconomic and Tobacco Mediation of Ethnic Inequalities in Mortality over Time: Repeated Census-mortality Cohort Studies, 1981 to 2011. Epidemiology 2018;29:506-16.
15. Klug TE. Peritonsillar abscess: clinical aspects of microbiology, risk factors, and the association with parapharyngeal abscess. Dan Med J 2017;64:B5333.
16. Radhakrishna N, Hew M. Addressing ethnic disparity in asthma trials. Respirology 2014;19:775-6.
17. Warin B, Exeter DJ, Zhao J, et al. Geography matters: the prevalence of diabetes in the Auckland Region by age, gender and ethnicity. N Z Med J 2016;129:25-37.
18. Sjardin N, Reed P, Albert B, et al. Increasing incidence of type 2 diabetes in New Zealand children <15 years of age in a regional-based diabetes service, Auckland, New Zealand. J Paediatr Child Health 2018;54:1005-10.
19. Simmons D, Kumar S, Crook N, et al. Diabetes among Māori women with self-reported past gestational diabetes mellitus in a New Zealand Māori community. Aust N Z J Obstet Gynaecol 2017;57:599-603.
20. Rumball-Smith J, Sarfati D, Hider P, et al. Ethnic disparities in the quality of hospital care in New Zealand, as measured by 30-day rate of unplanned readmission/death. Int J Qual Health Care 2013;25:248-54.
21. Rumball-Smith JM. Not in my hospital? Ethnic disparities in quality of hospital care in New Zealand: a narrative review of the evidence. N Z Med J 2009;122:68-83.

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