

Evaluation of the Relationship between Sublingual Varices and Hypertension

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Article Info

Article type:
Original Article

Article History:
Received: 22 Feb 2023
Accepted: 29 Jul 2023
Published: 12 Feb 2024

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ABSTRACT

Objectives: Sublingual varices are characterized by abnormally dilated veins. Some systemic conditions such as cardiovascular disease have been suggested to be associated with sublingual varices. Due to the convenience in examining the sublingual area, the present study aimed to assess the relationship between sublingual varices and hypertension.

Materials and Methods: In this descriptive-analytic study, 500 patients were categorized into two groups: those with sublingual varices and those without. Two oral medicine specialists assessed the lesions, and the blood pressure of all patients was measured while they were in a relaxed sitting position. Age and gender data were recorded for all participants. Statistical analysis included t-test, chi-square, and logistic regression, with significance set at $P < 0.05$.

Results: The frequency of sublingual varices was 21.8%. Mean systolic blood pressure was 139.68 ± 19.01 mmHg in patients with sublingual varices and 118.09 ± 13.78 mmHg in patients without the lesions ($P = 0.561$). Mean diastolic blood pressure was 100.45 ± 17.81 mmHg and 80.31 ± 12.08 mmHg in patients with and without sublingual varices, respectively ($P < 0.001$). Smoking was significantly more prevalent among patients who had the lesions ($P < 0.05$). Gender ($P = 0.686$) and age ($P = 0.875$) showed no significant relationship with sublingual varices, while smoking and blood pressure levels were significantly associated with these varices ($P < 0.001$).

Conclusion: It is advisable to monitor and manage blood pressure in patients with sublingual varices who may not be aware of their blood pressure status. Our results showed that smoking could be one of the predictive factors for sublingual varices.

Keywords: Mouth; Mouth Floor; Varicose Veins; Hypertension; Cigarette Smoking

- **Cite this article as:** Jamali Z, Katebi K, Alibabaei H, Jamei Khosroshahi A. Evaluation of the Relationship Between Sublingual Varices and Hypertension. *Front Dent.* 2024;21:07.

INTRODUCTION

Generally, varices are defined as dilated tortuous veins, vessels, and lymphatic vessels. Although sublingual varices often occur in the ventral surface of the tongue, they may also be observed on lips and floor of the mouth. In very rare cases, they may occur in the buccal mucosa, lips commissure, hard palate, and soft palate [1]. Sublingual varices

are clinically multi-dimensional, irregular, purple-blue, prominent, or bubble-shaped in the ventral or lateral border of the tongue. It is often extended to the tip of the tongue from the posterior part of the tongue bilaterally. These lesions are often asymptomatic and identified in the routine clinical examination [2]. These lesions may develop due to the weakening of the connective tissue of the

vascular wall of the veins owing to elastic fiber degradation due to aging [3]. Sublingual varices are rare among children [4]. It commonly occurs in adults [2], affecting both genders equally [5]. Generally, sublingual varices do not require any treatment, and the patient should be reassured that these lesions are benign [5,6]. One of the systemic diseases considered to be a risk factor for sublingual varices is hypertension. Shivakumar et al. [7] reported a significant relationship between sublingual varices and hypertension among adults.

Hypertension defined as systolic blood pressure above 140 mmHg or diastolic blood pressure above 90 mmHg, is the most common cardiovascular disease [8]. It is estimated to affect 45% of the world's population and is estimated to increase by age [9]. The complications of cardiovascular diseases, such as stroke, myocardial infarction, sudden death, cardiac failure, peripheral vascular disease, and renal failure highly depend on hypertension [10,11]. Based on the report of the World Health Organization (WHO) in 2014, hypertension is the cause of 51% of mortality due to stroke and 45% of death due to cardiovascular disease for all ages and all races [9]. Hypertension status is a critical factor in risk estimation for cardiovascular disease [12,13]. Hypertension is a complicated multifactorial disease that may not be explained by a simple mechanism [14]. Endothelial dysfunction, oxidative stress, and inflammation are the involved factors in hypertension in the laboratory models and clinical studies, though the exact mechanism is not yet understood [15].

A study by Hedström and Bergh [16] showed an association between sublingual varices and smoking, aging, and cardiovascular diseases. Another investigation, similarly showed a relationship between sublingual varices and hypertension in patients above 40 years old [17]. Akkaya et al. [18] conducted a descriptive study in which they evaluated the risk factors of sublingual varices. Results of their study suggested a relationship between elevated blood

pressure and using denture prosthesis and the development of sublingual varices.

Limited studies conducted to evaluate the relationship between sublingual varices and cardiovascular disease have reported controversial results [19,20]. Therefore, more accurate and expanded investigations are required to explain the relationship between sublingual varices and systemic diseases. Thus, the present study was conducted to evaluate the relationship between sublingual varices and hypertension. Findings of this study may be helpful in identifying the undiagnosed hypertensive patients in dental setting and early referral to physicians.

MATERIALS AND METHODS

The present descriptive-analytic study was conducted on 500 patients referring to the Faculty of Dentistry of Tabriz University of Medical Sciences. Subjects aged 25 years and above were enrolled, and those with systemic diseases other than hypertension, removable prosthesis, and pregnant/breastfeeding women were excluded [18]. Informed consent was obtained from each of the participants after an explanation of the study design and objectives. The research proposal was approved by the research ethics committee of the university (code: IR.TBZMED.REC.1399.559).

The patients were asked if they were smokers and smoking was defined according to the Centers for Disease Control and Prevention (CDC) as individuals who reported any type of smoking on a daily or occasional basis during the last 30 days [21].

The sublingual region and floor of the mouth of all patients were examined by two oral medicine specialists who were not previously informed of the patient's history and health status. In case of disagreements, a third specialist was consulted. Moreover, to assess screening reliability, 50 images of the floor of the mouth with varying degrees of sublingual varices were shown to the two oral medicine specialist and Cohen's kappa coefficient was assessed as 0.84. Based on the clinical examinations, patients were grouped into

those with and those without sublingual varices.

After documenting the variceal status, patients were instructed to rest and relax for a minimum of 5 minutes. Subsequently, their blood pressure was measured twice at five-minute intervals while the patient was seated, with the arm positioned at heart level. The readings were obtained using the Korotkoff-Riva-Rocci method, employing a sphygmomanometer and stethoscope. An average systolic blood pressure of 140mmHg or higher or a diastolic pressure of 90mmHg or higher was considered hypertensive [22]. In patients without previous history of hypertension, if the measured systolic blood pressure was above 140mmHg or the diastolic blood pressure was above 90 mmHg, they were referred to a cardiologist to confirm their diagnosis to avoid inclusion of pseudohypertension cases. Among the initial 500 examined patients, 19 had high blood pressure, but were not aware of their condition. These participants were referred to a cardiologist and the result was reported back to the study team. Eleven of these patients didn't visit a cardiologist, and were therefore excluded from the study and replaced by new participants. Data was analyzed by descriptive statistics (frequency, percent, and mean± standard deviation). Logistic regression was used to evaluate the relationship between the sublingual varices and hypertension while controlling confounding factors. P-values below 0.05 were considered significant.

RESULTS

Five hundred patients were examined in this study. There were 232 (46.4%) male and 268 (53.6%) females with a mean age of 42.74±12.23 years. In the group of patients with and without sublingual varices, 55% and 44% were men, respectively. A total of 109 (21.8%) patients had sublingual varices. Of these, 84 had hypertension and of the 391 without sublingual varices only 58 were hypertensives. The frequency of hypertension in patients with sublingual varices was 77%, compared with 14.8% for individuals without

the condition. The frequency of hypertension was significantly higher in patients with sublingual varices compared to those without the lesion ($P<0.001$).

Table 1, shows the mean and standard deviation of systolic blood pressure in patients with and without sublingual varices. There was no significant difference in systolic blood pressure between the two groups, while the diastolic blood pressure was significantly higher in patients with sublingual varices.

Table 1. Mean blood pressure (mmHg) and age (years) ± standard deviation in patients with and without sublingual varices

| | Sublingual varices | | P* |
|--------------|--------------------|--------------|-------|
| | Yes (N=109) | No (N=391) | |
| Age | 43.34±11.39 | 42.74±12.23 | 0.561 |
| Systolic BP | 139.68±19.01 | 118.09±13.78 | 0.056 |
| Diastolic BP | 100.45±17.81 | 80.31±12.08 | <0001 |

BP: blood pressure

*Independent t-test

Evaluation of smoking using the chi-square test demonstrated that smoking was significantly more prevalent among patients with sublingual varices (Table 2).

Results of the logistic regression analysis showed that gender and age were not significantly associated with sublingual varices, while smoking and blood pressure levels had a significant relationship with these lesions (Table 3). The identification of sublingual varices as an indicator of hypertension had a sensitivity of 58.7, and a specificity of 92.1.

Table 2. Frequency (percentage) of smoking in patients with and without sublingual varices

| | Sublingual varices | | P* |
|-------------|--------------------|-----------|--------|
| | Yes | No | |
| Smoking | 33(30.3) | 25(6.4) | <0.001 |
| Non-smoking | 76(69.7) | 366(93.6) | |
| Total | 109(100) | 391(100) | |

* Chi-square

Table 3. Bivariate logistic regression for determining the effect of age, gender, smoking and blood pressure on sublingual varices

| | B | Odds ratio | Standard error | P | 95% confidence interval | |
|-----------------------|-------|------------|----------------|--------|-------------------------|-------------|
| | | | | | Lower bound | Upper bound |
| Gender | -0.12 | 0.87 | 0.31 | 0.686 | -0.75 | 0.49 |
| Smoking | 2.6 | 13.46 | 0.42 | <0.001 | 1.77 | 3.42 |
| Age | 0.02 | 1.02 | 0.14 | 0.875 | -0.05 | 0.51 |
| Blood pressure | -1.85 | 0.15 | 0.17 | <0.001 | -2.19 | -1.51 |

DISCUSSION

In the present study, 500 patients were examined to evaluate the relationship between sublingual varices and hypertension. We found the prevalence of these lesions to be 21.8%, which was close to the 28.1% reported by Accardo et al. [23], but much lower than the 46% found by Lazos et al. [24]. The difference in these percentages may be attributed to the difference of study populations, i.e., different age groups and races.

Our findings indicated that the frequency of hypertension was significantly higher in patients with sublingual varices, which was consistent with the results of previous studies [7,17] and with those who established a significant association between sublingual varices and elevated blood pressure [16,18,24,25]. However, Ettinger and Manderson [19] did not find a significant link between sublingual varices and cardiovascular or any systemic diseases, which was in contrast to our findings.

Systolic blood pressure was higher in patients with sublingual varices but, the difference was not statistically significant. On the other hand, diastolic blood pressure showed significantly higher numbers in patients with sublingual varices ($P < 0.001$).

Smoking has also been suggested as a risk factor for sublingual varices [16,18]. We found a significant relationship between smoking and these lesions. Hedström and Bergh [16] reported the relationship between sublingual varices in non-smoker patients with hypertension as 44.7% and in smokers with hypertension as 64.7%. Their results corroborate our findings.

Lazos et al. [24] showed a significant relationship between sublingual varices and aging, lower limb varices, tobacco consumption, familial history of varices, hypertension, and diabetes type 2. Their results are consistent with the present study in terms of hypertension and smoking, whereas aging did not have a relationship with sublingual varices in the present study. Lynge Pedersen et al. [25] and Al-Shayyab et al. [20] suggested that aging has a relationship with sublingual varices. A possible explanation for the lack of a significant relationship in our study was the relatively low frequency of patients above 50 years (15.2%). In participants above 55 years with sublingual varices, 66.7% had hypertension, and only 13.3% had normal blood pressure. The process of aging and hypertension leads to morphological changes of the connective tissue and blood vessels, which eventually lead to disorders of blood circulation and the development of varices.

Consistent with the outcomes reported by Accardo et al. [23], our study did not reveal a significant association between sublingual varices and gender. Additionally, the results of our logistic regression analysis identified hypertension and smoking, but not gender and age, as predictive factors influencing the prevalence of sublingual varices.

Accardo et al. [23] found a significant relationship between the prevalence of sublingual varices and different stages of hypertension. The accuracy of their regression model using hypertension stage, age, and smoking was 0.75, while it was 0.84 in the current investigation.

Screening for hypertension using

identification of sublingual varices in the present study would identify 58.7% of hypertensive patients, with a high specificity of 92%. In the study by Hedström et al [17] the sensitivity and specificity were 48% and 82% respectively.

Examining the sublingual areas in dental visit is simple, and it does not consume much time. Therefore sublingual varices may be a good clinical sign to identify hypertensive patients in dental setting. Based on the results of the present study it seems rational to measure blood pressure in patients with sublingual varices who are not aware of their blood pressure status before dentistry procedures and refer them to a cardiologist. Further prospective studies on this subject are suggested.

CONCLUSION

Our study points to blood pressure and cigarette smoking as the primary predicting factors influencing the occurrence of sublingual varices. However, gender and age did not exhibit a significant relationship with the presence of these lesions.

ACKNOWLEDGMENT

This study was supported by Tabriz University of Medical Sciences.

CONFLICT OF INTEREST STATEMENT

None declared.

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