Subpontic Osseous Hyperplasia: Comprehensive Review of the Literature and Presentation of New Case History

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**Purpose:** To increase awareness of subpontic osseous hyperplasia (SOH), an uncommon benign mass found underneath the pontics of fixed partial dentures (FPD) and occasionally in implant-supported dental prostheses. **Materials and Methods:** A PubMed search in the English-language literature was conducted for case reports and case series of SOH. Demographic information gleaned from these publications included patient age and gender, lesion sites, outcomes, comorbidities, symptomatology, and periodontal involvement. To exemplify the findings of SOH, a clinical investigation of a 73-year-old affected woman has been detailed. **Results/Conclusion:** With the inclusion of this featured case, 71 patients with 80 affected sites were identified with SOH and served as the basis for the provided database. To date, this aggregation of cases represents the largest collection to undergo clinicopathologic review. SOHs appeared as dome-shaped radiopacities and tended to exhibit increased osteosclerosis with increased duration. The average age at discovery was 57 years, and SOH was found somewhat more often in women. Lesions were more likely to occur in the left posterior mandible. Affected patients may experience increased difficulty maintaining adequate oral hygiene, potentially leading to periodontal disease or discomfort. Overgrowths should be surgically removed when satisfactory oral hygiene measures have been compromised, when there are atypical clinical or radiographic presentations, or with incident symptomatology. Int J Prosthodont 2019;32:339–344. doi: 10.11607/ijp.6118

Subpontic osseous hyperplasia (SOH) is an uncommon reactive bone overgrowth located inferior to a conventional fixed partial denture (FPD) pontic and occasionally with an implant-supported dental reconstruction. In 1971, Calman et al documented the first account of SOH with FPD. This lesion has also been referred to as subpontic osseous hyperostosis, osteoma, plateauitization, reactive subpontine exostosis, subpontic osseous proliferation, and subpontic tissue enlargement. Typically, SOH is an asymptomatic incidental radiopaque finding subjacent to an FPD pontic and appears dome-shaped or, less often, bilobular. Clinically, lesions may demonstrate slowly progressive firm expansion, hindering effective oral hygiene and increasing the difficulty of passing dental floss through this region. Treatment involves surgical resection, and recurrence is rare. Only one case of spontaneous resolution of SOH has been reported.

To expand the knowledge of SOH, this article summarizes the clinical and radiographic findings of a new case history in the mandible in a 73-year-old woman. With the inclusion of this report, a database has been compiled that represents the largest aggregation of cases of SOH, totaling 71 patients and 80 sites affected.
**MATERIALS AND METHODS**

A PubMed search from 1971 to June 2018 was conducted for cases and case series of subpontic overgrowths published in the English-language literature. The search was focused on clinical investigations, review articles, case reports, case series, and textbooks, employing the following keywords: subpontic osseous proliferation; subpontic osseous hyperostosis; subpontic osseous hyperplasia; subpontic tissue enlargement; osteoma; plateautilization; and reactive subpontine exostosis. In addition, the references of all the culled articles were searched for additional cases. Other cases were sought on the internet via the Google search engine. Articles were screened for available demographic and pertinent oral findings and included patient age and gender, affected pontic site, age of prosthesis, age of FPD at lesion onset, history of resection and biopsy, outcome, presence of unaffected FPDs, symptomatology, comorbidities, presence of other exostoses, and periodontal complications.

**RESULTS**

Subpontic osseous overgrowth was a sine qua non for SOH and was found radiographically in all 71 patients and all 80 involved sites. The demographic information of these patients (including the one in this report) was collected (Table 1). Seven of these cases, identified from textbooks or websites, had included only radiographic presentation of the lesion but excluded patient demographics, clinical findings, and symptomatology.

**Affected Patient Gender**

Gender was specified in 60 patients, of whom 53.3% (32/60) were women and 46.7% (28/60) were men.

**Affected Anatomical Sites**

Of the 71 patients reported with SOH, 9 had bilaterally affected FPDs, yielding a total of 80 affected sites. Overall, there was a decisive (96.3% [77/80]) affinity for SOH in the mandibular posterior dentition; only 3.8% (3/80) of osseous lesions occurred in the posterior maxilla. Most of the lesions (57.5% [46/80]) were located on the patient’s left side, and 42.5% (34/80) were located on the right.

**FPD Age and Onset of SOH**

At SOH presentation, the estimated ages of the FPDs ranged from 3 to 40 years, with the majority fabricated > 10 years prior to the time of the report. Most of the reported narratives were too imprecise to determine the actual onset of SOH, as its discovery was an incidental finding or the timeline was based on anecdotal evidence; ie, when the patient had begun to experience difficulty passing dental floss underneath the pontic.

**Unaffected FPDs**

Based on the available radiographic images and clinician narratives, nine patients had bilateral mandibular FPDs with unilateral SOH. One other patient had unaffected maxillary and mandibular posterior FPDs on the opposing side of SOH.

**Resection and Outcome**

Nearly 44% (28/64) of the patients underwent surgical removal of the SOH. It was unspecified whether four resected specimens were submitted for histopathologic review. Only 2.5% (2/80) of cases recurred, and apparently only these secondary lesions underwent histopathologic assessment. There were single cases of spontaneous resolution of SOH following sectioning of the FPD and removal of the pontic, one developing bisphosphonate-related osteonecrosis and another case that had purportedly “pushed the [FPD] off the teeth.” None of the cases underwent malignant transformation. One other patient with bilateral SOH had histopathologic assessment of both lesions.

**Presence of Other Exostoses**

Of 64 reports with patient narratives, 37.5% (24/64) documented the presence of tori in various locations (mostly in the mandibular lingual regions). 6.2% (4/64) specifically indicated the absence of any tori, and 36 patients were without mention of either finding.

**Other Comorbidities**

A total of 28 cases provided commentary as to the patient’s medical history. The number of reported

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**Table 1** Demographic Summary of Affected Patients with Subpontic Osseous Hyperplasia

<table>
<thead>
<tr>
<th>Parameters</th>
<th>No. (%) of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y), n = 59</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>57.0</td>
</tr>
<tr>
<td>Range</td>
<td>29–81</td>
</tr>
<tr>
<td>Gender, n = 60</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>32 (53.3)</td>
</tr>
<tr>
<td>Male</td>
<td>28 (46.7)</td>
</tr>
<tr>
<td>Sites affected, n = 80</td>
<td></td>
</tr>
<tr>
<td>Maxilla</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Mandible</td>
<td>77 (96.3)</td>
</tr>
<tr>
<td>Sides affected, n = 80</td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>34 (42.5)</td>
</tr>
<tr>
<td>Left</td>
<td>46 (57.5)</td>
</tr>
<tr>
<td>Other exostoses, n = 64</td>
<td></td>
</tr>
<tr>
<td>Symptomatology, n = 64</td>
<td></td>
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<tr>
<td>Periodontal complications, n = 64</td>
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</tbody>
</table>

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disorders were: hypertension (6); osteoporosis (3), including 2 patients who took alendronate; arthritis (3); depression/anxiety (3); estrogen deficiency (3); stroke (2); heart disease (2); gastroesophageal reflux disease (2); chronic obstructive pulmonary disease (2); hypothyroidism (2); gallbladder disease (2); hypercholesterolemia management (2); and 1 each of breast cancer, pituitary adenoma, parathyroid adenoma, multiple sclerosis, uterine disease, kidney stones, tobacco abuse (40 packs/year), hepatitis, and osteonecrosis. One patient took calcium, and another took magnesium. Thirteen patients were specifically listed with a noncontributory medical history, and 30 publications did not provide any medical narration.

Patient Symptoms
Overall, only 12.5% (8/64) of the patients elicited some extent of oral discomfort associated with SOH, including one patient who developed dull pain and gingival swelling attributed to osteonecrosis subsequent to intake of a bisphosphonate.

Periodontal Complications
Of the 64 patient narratives, 11 provided commentary on the periodontal health of the FPD abutments, 10 (15.6%) of which included specific manifestations of periodontal disease, such as increased gingival pocket depths, interproximal bone loss, erythema, and bleeding. Ten patients admitted to difficulty cleaning underneath their prostheses.

CASE REPORT
A 73-year-old woman sought comprehensive dental care at the University of Maryland School of Dentistry. The patient recalled the placement of several crowns at various times and bilateral mandibular FPDs in the early 1970s. The left FPD was subsequently replaced in 1986, as it had “become loose.” About 3 years prior, another clinician had noticed a bony overgrowth below the left FPD pontic. Within the last year, the patient reported that she was no longer capable of passing dental floss beneath the left prosthesis. Additionally, the patient stated that she had chewed predominately on the right side up until the past year, when the mandibular right second premolar had “begun to deteriorate.”

The medical status was remarkable for hypertension, coronary artery disease and placement of two stents, ocular migraines, gastroesophageal reflux disease, depression, spinal stenosis, osteoarthritis, mild asthma, and cholecystectomy. Current medications included losartan, amlodipine, carvedilol, aspirin, magnesium citrate, pantoprazole, and celecoxib. The patient denied any history of metabolic bone disorders, head and neck radiotherapy, intake of osseous regenerating pharmaceuticals, or tobacco and alcohol abuse. The patient reported an episode of temporomandibular disorders (TMD) about 15 years ago and wore an occlusal splint for about 6 months until achieving relief of symptoms.

Intraoral examination was significant for recurrent severe caries in the mandibular right second premolar FPD abutment. Of note, firm alveolar expansion was evident buccal to the mandibular left FPD, giving the pontic a diminutive appearance in an occlusal to apical direction, in marked contrast to the mandibular right FPD pontic. Painless, superficial ulcerations were observed along the left buccal area, likely attributed to masticatory trauma (Fig 1a). The mandibular FPD on the opposing side was unaffected (Fig 1b). The palatal vault was normal (Fig 1c). The mandible displayed bilateral moderately sized lingual tori (Fig 1d) and bilateral small anterior exostoses (Fig 1e). Periodontal probing depths were ≤ 3 mm in all sites, including the FPD abutments. Radiographically, a conspicuous radiopaque concave-shaped osseous lesion was noted immediately under the left bullet-shaped pontic, occluding any available embrasure space. It then became apparent that the left pontic was otherwise comparable in size to the right pontic, but had been partially obscured clinically by a bony overgrowth. Osseous malformation was not seen at the right bullet-shaped pontic (Fig 2). The radiographic and clinical presentations were consistent with SOH and deep caries affecting the mandibular right second premolar. Radiopacities within the mandibular premolar areas represented the superimposed bilateral lingual tori.

DISCUSSION
With the inclusion of the featured case, this report has provided a database that represents the largest aggregation of cases of SOH, including 71 patients with 80 sites affected. Although the total of affected patients limits any rigorous statistical analysis, several trends emerge from the data. The average age of affected patients was 57.0 years, and there was a slight gender predilection (53.3% women vs 46.7% men). At SOH presentation, the estimated age of the FPDs ranged from 3 to 40 years, with most fabricated >10 years prior to the time of the study. Only 10 patient narratives contained periodontal assessments, making it difficult to determine the actual incidence of periodontal disease associated with SOH. Specifically, six lesions were characterized only by gingival descriptors (enlarged, hemorrhagic, inflamed, red, swelling), and four had pocket depths ranging from 5 to 8 mm.

The vast majority of SOHs are discovered as an incidental finding during clinical or radiographic examination. The subpontic gingiva is usually noninflamed and occludes a portion or all of this space. Radiographically,
the majority of SOHs are dome-shaped opacities and occasionally appear bilobed.\textsuperscript{5} With continued age, lesions tend to exhibit increased osteosclerosis.\textsuperscript{11} Long-standing cases of SOH, as seen in this report, may conform to the underlying surface of the pontic and assume a saucer-like overgrowth.\textsuperscript{8,13} Isolated cases have manifested a thin radiolucent line of demarcation along the crestal bone.\textsuperscript{23}
There was a preferential site of occurrence for SOH, with the preponderance found in the posterior mandible. Overall, there was a somewhat pronounced unilaterality to the formation of SOH, with 58.0% (47/81) of sites on the left and 42.0% (34/81) on the right. Clinical investigations have established a right-sided chewing predominance in various subpopulations, while other studies have demonstrated a left-sided preference or bilaterality. The present patient had been a habitual right-sided chewer, and the SOH was located on her left side. None of the previous case reports had included chewing-side preference. It would be interesting to ascertain whether there is any causal relationship to chewing-side preference and the formation of SOH. As such, clinicians are urged to include this information in future publications because of its possible etiologic relevance.

Nearly 44% (28/64) of the patients underwent surgical resection of the SOH. As most cases of SOH are pathognomonic, the rationale for removal should be based on the patient’s inability to effectively cleanse under the pontic (particularly in older adults), atypical clinical and radiographic presentations, periodontal complications, and/or symptomatology. Nevertheless, it was rather alarming that four resected specimens apparently had not undergone microscopic assessment, including two patients who only had their recurrent lesions biopsied. It is paramount that resected SOH tissue be submitted for histopathologic examination and not discarded, irrespective of patient age. In fact, Siar et al reported a case of a 38-year-old patient with a radiolucent/radiopaque ameloblastoma in the subpontic area of a mandibular posterior FPD. Moreover, Kabani and Pollack documented a 41-year-old with a supracrestal bone overgrowth with a radiographic appearance strikingly similar to SOH that was diagnosed as an osteosarcoma upon histologic assessment. The patient in this case report is contemplating the option to undergo osseous resection of the excess bone to improve her FPD oral hygiene capability.

Other radiographic radiopacities that should be included in the differential diagnosis for SOH are osteoma, retained root tip, idiopathic osteosclerosis, focal cemento-osseous dysplasia, and osteosarcoma. Soft tissue pathologies that could mimic the clinical presentation of SOH are inflammatory and pharmacologically induced gingival hyperplasia, peripheral giant cell granuloma, peripheral odontogenic fibroma, peripheral ossifying granuloma, peripheral odontoma, pyogenic granuloma, and other benign and malignant processes. Furthermore, various syndromes may be associated with hyperostosis, such as Gardner syndrome, Proteus syndrome, sclerosteosis, van Buchem disease, SAPHO syndrome, and Caffey disease. Histopathologically, SOH is composed mostly of dense viable cortical bone with occasional osteoblasts and osteoclasts, reduced marrow, and an absence of inflammatory infiltrate. An unusual case of a calcified subpontic overgrowth with cartilaginous metaplasia bearing a similar clinical and radiographic presentation to SOH was incorporated into the database of overall cases.

Although the actual mechanism for the development of SOH has not been definitively elucidated, several etiologic factors have been suggested. The proliferation of excess bone may be stimulated along a vector opposing the occlusal forces. This explanation may be reinforced by the confinement of SOH to the posterior arches, where the magnitude of biting forces is greater, which is further evidenced by the lack of published cases of SOH in the anterior arches, where masticatory forces are normally reduced in magnitude. Exostoses have been attributed to increased bruxism, tooth attrition, and TMD. If one thinks of SOH essentially as a localized form of an exostosis, then it might be conceivable that it owes its origin to increased occlusal demands in the posterior arches. Refuting this premise was the finding that there was a greater occurrence of SOH on the nonfavored chewing side. Some other cases of exostoses are thought to arise from an increased genetic predisposition. However, all of the cases of SOH have appeared to be nonfamilial occurrences. Although not specifically implicated with SOH, other hyperostotic processes have been associated with orthodontic implant placement, free gingival grafts, aspergillus infection, and auditory osseseointegrated implantation. Alternatively, the apparent correlative relationship of exostoses and SOH may simply be aleatory, as the prevalence of exostoses varies significantly among studied subpopulations, ranging from 0.9% to 61.7% with palatal tori and 0.5% to 64.4% with mandibular tori. The concurrence of intraoral exostoses and SOH was difficult to ascertain, as the majority of published reports lacked clinical details and control groups, leaving this issue unresolved.

One other etiologic promoter for the development of SOH that was investigated was the contributory role of systemic comorbidities. Medical histories were only provided for 39.4% (28/71) of the affected patients, diminishing the strength of any potential correlation. The most prevalent disorder associated with SOH was hypertension, found in 21.4% (6/28) of patients, and 10.7% (3/28) of patients elicited histories of osteoporosis, arthritis, depression/anxiety, or estrogen deficiency. These stated comorbidities were comparable to individuals in the general population, relegating their concordance with SOH to chance or to underestimation due to the small number of affected patients with concomitant medical histories. It is desired that future case reports and case series of SOH also include commentary on systemic burdens, with the ultimate goal of establishing whether there is any clinical relevance.
CONCLUSIONS

SOH represents a benign overgrowth of the edentulous ridge subsequent to FPD placement. This article provides a comprehensive review of SOH and has established a database of published cases. To increase recognition of SOH, the clinical and radiographic features of a 73-year-old affected woman have been included.

ACKNOWLEDGMENTS

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REFERENCES