

原文題目(出處)：	Cone-beam computed tomographic evaluation of styloid process: a retrospective study of 208 patients with orofacial pain
原文作者姓名：	Haluk Oztunc, Burcu Evlice
通訊作者學校：	Cukurova University, Saricam, 01330 Adana, Turkey
報告者姓名(組別)：	林晏任 Intern L 組
報告日期：	103.7.11

內文：

Introduction

Eagle's syndrome (ES) :

- 1) Recurrent pain in the oropharynx and face
- 2) Calcification of the stylohyoid ligament (SHL) or elongated styloid processes (ESP) greater than 30mm.

Palpation of the styloid process in the tonsillar fossa is indicative of elongation.

Although there are numerous reports on SP length and ES using panoramic radiograph or CT, we could not find "any study" based on CBCT examination to evaluate the length and medial angulations of SP and related clinical complaints.

SO...

The purpose of this study:

- 1) To assess the structural characteristics of styloid process (SP) by cone-beam computed tomography (CBCT) examination in a patient population suffering from orofacial pain.
- 2) To assess the prevalence of elongated SP and its relation to "gender", "site" and "subjective symptoms" in the study population.

Materials and methods

The clinical and radiographic records of 208 patients suffering from neurological symptoms in maxillofacial region.

They had referred to neurology department and then consulted to the faculty of dentistry for CBCT examination from Jan. 2011 to Jan.2013.

This study's protocol was carried out according to the principles described in the Declaration of Helsinki.

Clinical symptoms including:

- (1) pain (2) dizziness (3) tinnitus (4) otalgia (5) dysphagia
- (6) foreign body sensation (7) pain on turning head.

As well as clinical symptoms, the radiological examination of the structure, length, and medial angulations of SP were performed on CBCT images of the patients in order to investigate the incidence and characteristics of ES in this patient population.

All the CBCT examinations had been taken using 120 kV, 3.8mA and 20 seconds exposure.

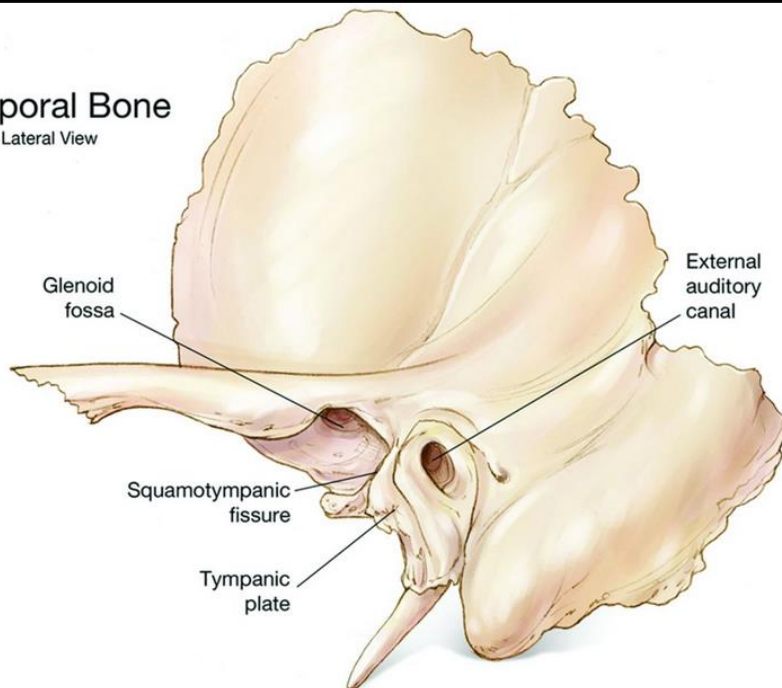
Styloid processes were evaluated for their average lengths and angles.

The length of SP was measured from the caudal margin on the tympanic plate to the tip of the process. (下圖)

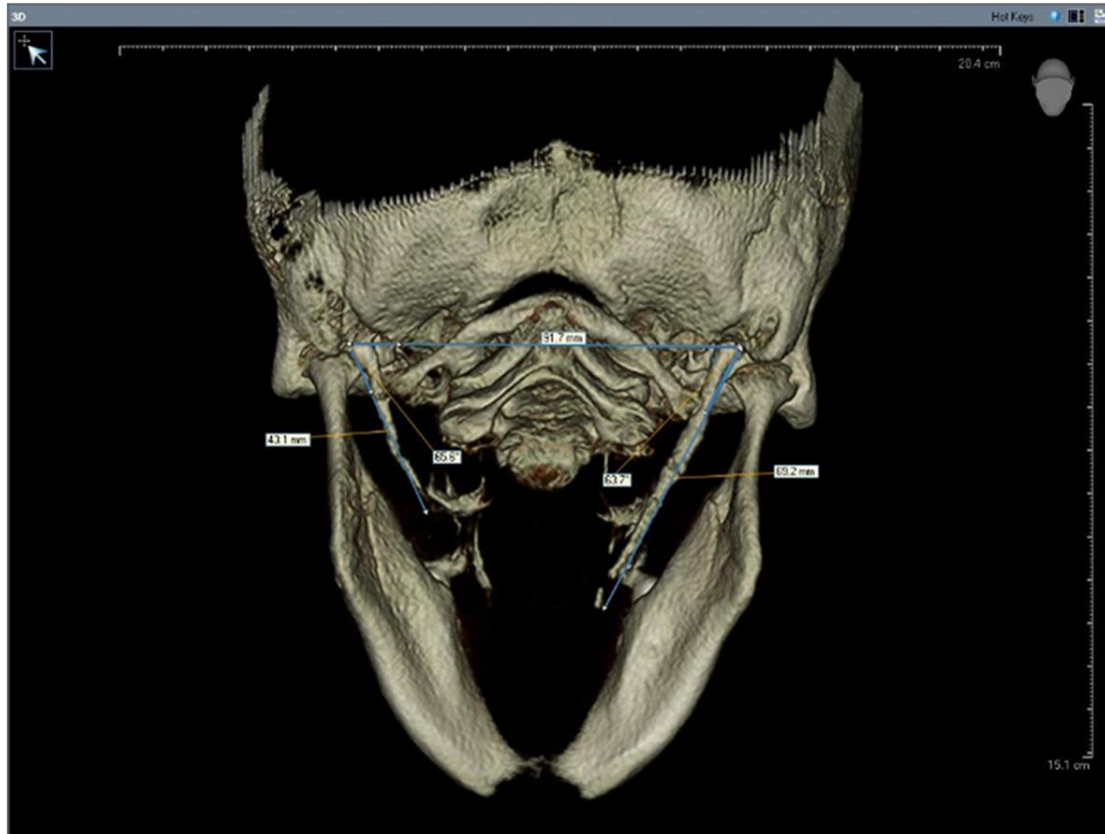




Temporal Bone
Lateral View

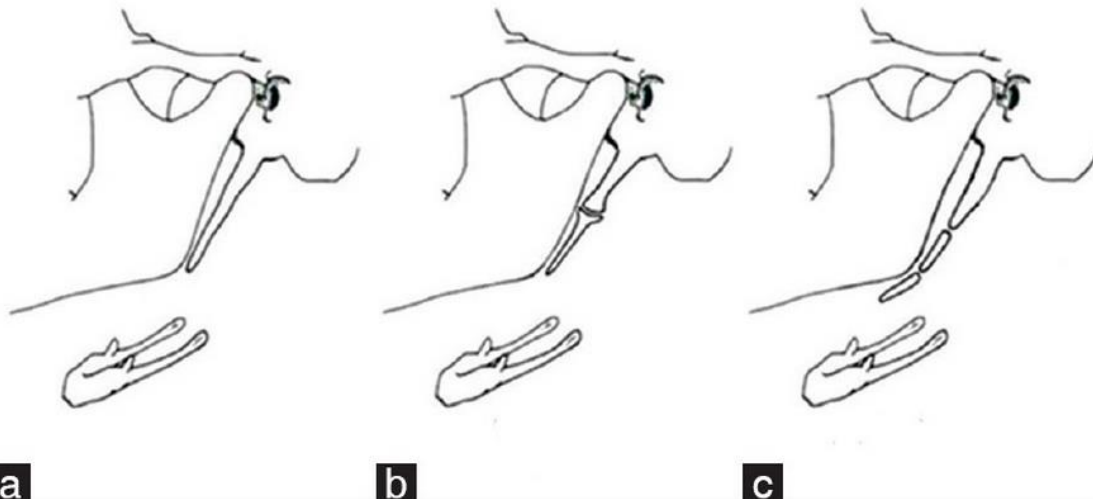


The ossification of SHL that joined SP was added to the measurement. And the angle between the line connecting the base of the both SPs and the axis of the SP was also measured. (下圖)



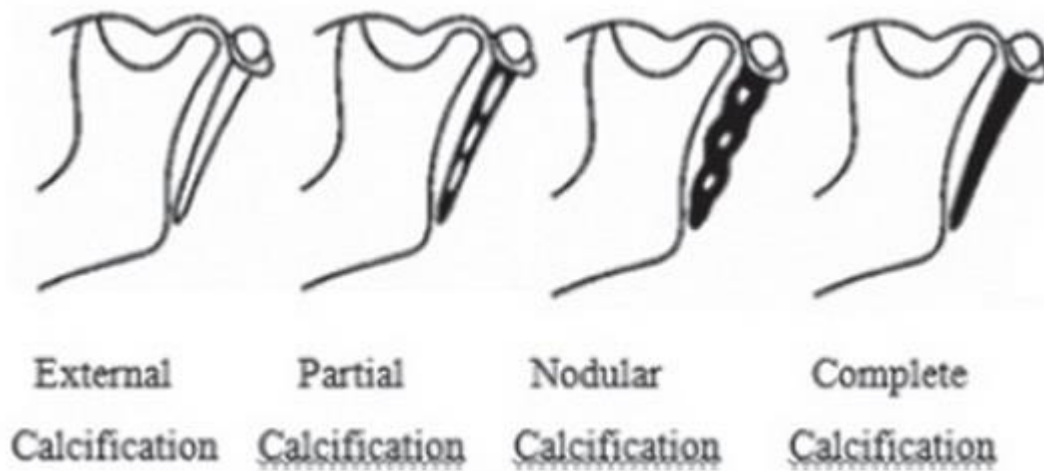
The morphology of the stylohyoid complex was classified into three types:

- 1) an uninterrupted, elongated SP.
- 2) the SP is apparently joined to the SHL by a single pseudoarticulation.
- 3) consists of interrupted segments of the mineralized ligament, multiple pseudoarticulations.



Calcification patterns of SP were classified into four types:

- A) (external calcified) a thin radiopaque border with a central radiolucency.
- B) (partially calcified) has a thicker radiopaque outline and complete opacification but small, sometimes discontinuous, radiolucent cores.
- C) (nodular) has a scalloped outline. It may be partially or completely calcified with varying degrees of central radiolucency.
- D) (completely calcified) is totally radiopaque with no radiolucent interior.



Result

Out of a total of 208 patients, 96 subject(46%) had not-elongated SP, 28 (13%) had left side, 16(8%) had right side, and 68 (33%) had bilateral elongation of the SP. (Figure 3)

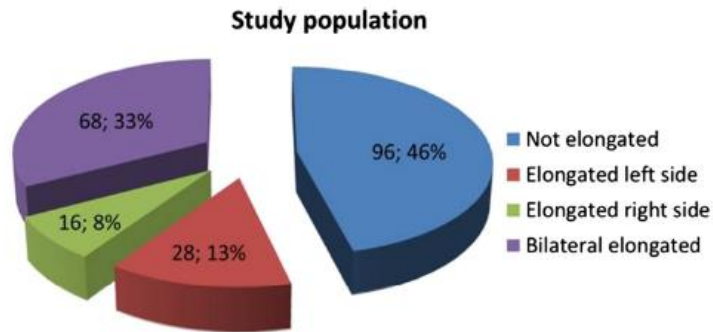


Figure 3 The distribution of the study population according to styloid process elongation.

The types of SP and the patterns of calcification stratified according to gender are listed in Table 1.

Type 2 was the most frequent type of SP encountered(212/416).

The most frequent pattern of calcification was "partially calcified (Pattern B)".(156/416)

Table 1 Comparison of the calcification type and pattern of styloid process among site and gender

Styloid	Site	Male	Female	χ^2	p
Calcification					
Calcification type					
Type 1	Right	36	32	0.699	0.403
	Left	32	40		
Type 2	Right	56	48	0.431	0.511
	Left	64	44		
Type 3	Right	24	12	0.018	0.891
	Left	20	8		
Calcification pattern					
Pattern A	Right	44	16	0.409	0.522
	Left	48	24		
Pattern B	Right	40	44	0.018	0.891
	Left	36	36		
Pattern C	Right	8	4	6.328	0.011
	Left	0	8		
Pattern D	Right	24	28	0.901	0.342
	Left	32	24		

By Chi-square test

It is not obvious differences were proven between the types of SP calcification among the "gender" and "site" prevalence.($P > 0.05$)
 因為 P value 值大於 0.05，所以我們不能去證明性別和位置上對於 SP 鈣化是有差別的。

We only found the patterns C of SP calcification has significant difference among gender and site($P < 0.011$).

It means the prevalence of Pattern C styloid process "in males" was significantly increased in the right side. However, it was significantly increased in the left site in "females".

The relationship between gender and elongation of the SP was not statistically significant($P = 0.771$).

By Independent sample t-test

The mean age of the patients with elongated SP(47.28 ± 12.4 years) was lower than those without elongated SP(50.54 ± 13.01 years) but the difference was not statistically significant.($P = 0.066$)

The patients with elongated SP had significantly decreased angle values compared with non-elongated ones($P < 0.001$). (Table 2)
 代表 SP 是往前下內縮的。

Table 2 Comparison of the difference in mean angle of the styloid process according to gender and elongation status

Patients	Elongated		Not elongated		p value
	N	Angle (Mean ± SD)	N	Angle (Mean ± SD)	
Male	64	69.58 ± 3.63°	52	71.25 ± 3.77°	0.017
Female	48	66.19 ± 2.99°	44	68.54 ± 4.06°	0.002
Total	112	68.13 ± 3.76°	96	70.01 ± 4.12°	0.000

And males had significantly higher "angle values" than females in both elongated (P <0.001) and non-elongated (P =0.001) groups.

But, there were no statistically significant differences in "length values" of SP between males and female in both elongated(P =0.157) and non-elongated(P= 0.387) groups.(Table 3)

Table 3 Comparison of the difference in mean length (cm) of the styloid process according to gender

Patients	Male		Female		p value
	N	Length (Mean ± SD)	N	Length (Mean ± SD)	
Elongated	64	3.62 ± 0.48 cm	48	3.81 ± 0.84 cm	0.157
Not elongated	52	2.02 ± 0.56 cm	44	2.11 ± 0.42 cm	0.387
Total	116	2.90 ± 0.95 cm	92	3 ± 1.09 cm	0.495

By Odds ratio test

In terms of subjective symptoms, significantly increased prevalence of symptoms "except headache" was observed in patients with elongated SP (P <0.05).(Table 4)

Table 4 Comparison of the prevalence of the subjective symptoms between patients with and without elongated styloid process

Symptoms	Elongated	Not elongated	OR	95% CI	p
	N (%)	N (%)			
Headache	88 (78.6)	84 (87.5)	0.5	0.2 – 1.1	0.093
Dizziness	44 (39.3%)	24 (25%)	1.9	1.1 – 3.5	0.029
Tinnitus	16 (14.3)	4 (4.2)	3.8	1.2 – 11.9	0.020
Otalgia	20 (17.8)	4 (4.2)	5	1.6 – 15.2	0.004
Dysphagia	68 (60.7)	8 (8.3)	17	7.5 – 38.5	0.000
Foreign body sensation	40 (35.7)	3 (3.1)	17.2	5.1 – 57.9	0.000
Pain on turning head	59 (52.7)	5 (5.2)	20.3	7.6 – 53.6	0.000

Abbreviations: OR Odds ratio, CI confidence interval.

Discussion

The incidence of the ESP is controversial (ranges between 1.4% and 30%) in the literature. The incidence of the ES is much lower than the incidence of ESP.

Only small percentages (between 1% and 5%) of the patients were reported to actually be symptomatic.

The results of the present study showed that 54% of the study population had ESP which could contribute the complaints of the patients.

The higher incidence rate observed in the present study might be due to the special study population suffering from some symptoms.

The threshold for elongation is highly variable but "30mm" were considered as the threshold by many publications.

Most frequently, a panoramic radiograph is used to determine whether the SP is elongated. Many factors, such as magnification of the different panoramic machines can affect the apparent length of the stylohyoid complex.

For 2-D radiographic examinations, it is difficult to get accurate determination.

But, in 3-D CT reconstruction, there is no geometric error due to magnification effects.

And operator-related error is also minimized in 3-D CT.

However, 3-D CT imaging has some limitations:

- 1) slight movement may result in degradation of images
- 2) higher radiation dose is required.

Therefore, CBCT may be recommended as a better choice in dose-sparing.

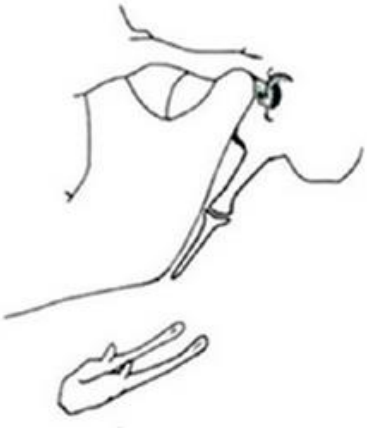
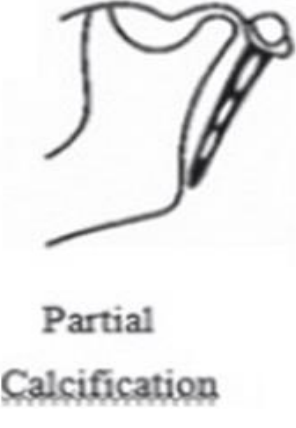
The advantages of CBCT imaging are the following:

- 1) lower radiation dose than conventional CT.
- 2) the possibility of individualized overlap- free reconstructions.
- 3) DICOM data can be imported and exported for other applications.

Anbiaee and Javadzadeh used panoramic radiograph for the measurement of SP length and indicated that SP length was associated with increasing age.

However, in the present CBCT examination, we did not find a relationship between patient's age and SP length.

The difference about this issue in different studies may be due to the race of the patients and diagnostic machines used for measurement.

The most common morphology of SP	The most common pattern of ossification
Type 2: pseudoarticulated type in both male and female	Pattern B: partially calcified
	
Elongated SP	Non-elongated SP
Narrow angle	Normal angle

Similarly, female patients had significantly narrower angle values than male patients in both elongated and non-elongated groups ($P < 0.05$).

It could make female patients more prone to corresponding complaints.

It was also observed that prevalence of subjective symptoms was significantly higher in the patient with elongated SP.

Moreover, a significant correlation between the "angle and length values" of SP was observed in the present study($P < 0.01$)

Conclusions

This study presents the CBCT as an alternative method to CT or panoramic radiographs for the measurement and the assessment of the styloid process.

It was observed that the patients suffering from orofacial pain, who also had ESP, had increased rate of corresponding neurological complaints compared with non-elongated ones.

Further clinical studies, also including patient with ESP but "without pain" complaints, is necessary to evaluate the exact correlation between presence of styloid elongation and neurological complaints.

題號	題目
1	臨床檢診依格氏症候群(Eagle's syndrome)，病人做某些動作時會出現隱約的顏面疼痛，但做下列何種動作時除外？ (A) 轉頭時 (B) 閉口時 (C) 張口時 (D) 吞嚥時
答案(B)	出處：99年第二次專門職業及技術人員高等考試
題號	題目
2	Breault(1986)提出 Eagle's syndrome，下列描述何者錯誤？ (A) 可能跟韌帶鈣化有關 (B) Styloid process 變長導致疼痛 (C) 下顎髁突增生，導致開口疼痛 (D) 患者有時會產生類似顳顎關節疼痛之症狀
答案(C)	出處：99年第一次專門職業及技術人員高等考試