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SIZE OF PITUITARY FOSSA AND PREVALENCE OF CERTAIN BENIGN INTRACRANIAL CALCIFICATIONS IN A NORMAL JAPANESE POPULATION; A ROENTGENOGRAPHIC STUDY

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正常日本人のトルコ鞍の大きさ並びに非病的頭蓋内石灰化の出現に関するレ線学的研究

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要約：トルコ鞍はレ線診断上重要なものとされている．すなわち頭蓋内腫瘍その他の病変によつて変化を起しやすいために，頭蓋内病変の発見に重要なものである．従つてトルコ鞍のレ線学的研

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究は以前から内外を問わず研究されている．これ等の研究では日本人のトルコ鞍の大きさは欧米のそれと比較して全体に大きい値を示している．この点の追求と共に日本人の男女間の差違の有無，さらにトルコ鞍付近に見られる非病的石灰化の出現率を 525正常例について検討した．

トルコ鞍の大きさについては欧米のそれに比べると垂直径，水平径とも多少大きい値を示した．また，内牀鞏帯石灰化率は成人では 3.0%の値であり，欧米の値より低い．後牀鞏帯石灰化率は 4.4%であつた．

Many studies concerning measurements of the pituitary fossa have been reported. It is well known in roentgenographic studies of the skull that the sella turcica is an important indicator of disease because its appearance changes with erosion or an increase in intracranial pressure by tumors and other lesions. Kornblum[1] reported that in a series of cases with a variety of intracranial tumors, 61% had abnormalities of the sella turcica. Grossly abnormal sellae are easily recognized, but borderline abnormalities are difficult to diagnose[2]. A pituitary fossa smaller than normal size may indicate hypoplasia of the pituitary gland, while one of greater than normal size may reflect the presence of a tumor in the gland. The normal shape and size of the sella turcica varies widely as reported by Enfield[3], Heublein[4] and Hare[5] in the United States, and Wada[6] and Muroya[7] in Japan. Also intrasellar, suprasellar, parasellar and metasellar space-occupying lesions may alter its appearance[3]. Establishment of the normal dimensions of the sella turcica is therefore important.

Various methods have been used for measuring the pituitary fossa. Haas[9] used transparent overlays to determine in square millimeters the profile of the pituitary fossa on lateral roentgenograms of the skull, and obtained a value of 86.1 mm^2 for adult males and 87.2 mm^2 for adult females. Using these methods, Hare[5] obtained a value of 74 mm^2 for both sexes in the United States, while in Japan, Nagayama[10] obtained a value of 84.3 mm^2. Lorenz, according to Bergerhoff, determined projection angles on lateral films to obtain greater accuracy. However, the determination of horizontal and vertical diameters, with an ordinary plastic ruler scored in millimeters is the most practical and widely used method[2,11,12]. Camp[13], Kornblum[1] and Heublein[5] in the United States and Nagayama[10] and Tamura et al[14] in Japan also used this technique. Few studies based on large numbers of subjects have been conducted in Japan. The present study was made to clarify comparisons of measurements of the sella turcica in Westerners and Japanese subjects by obtaining measurements of the sella turcica by age and sex, and to compile tables showing normal ranges for roentgenological interpretation.

METHOD OF STUDY

The horizontal and vertical diameters of the sella turcica were determined in a series of 525 consecutive roentgenological examinations of the skull interpreted as normal. Some lack of agreement has prevailed in earlier reports in the literature as to the reference points to be used for such measurements[15]. The method of measurement described by Silverman[15] was used in this study.

The horizontal measurement was considered the distance between the tuberculum sellae and the tip of the dorsum sellae—a plane approximating the position of the diaphragma

sellae. The vertical diameter consisted of a perpendicular from this horizontal to the deepest point of the pituitary fossa. All measurements were made from the better films of lateral stereoscopic pairs, using a plastic ruler scored in millimeters.

Presence or absence of petroclinoid calcification was also recorded, without reference to degree.

RESULTS OF STUDY

Table I shows the mean horizontal and vertical measurements of the pituitary fossa, by sex and age.

Table I: Mean Value of Pituitary Fossa Measurement by Horizontal, Vertical, Sex and Age

Sex	Male			Female			Total		
Age	No.	Horizontal M ± 2σm (cm.)	Vertical M ± 2σm (cm.)	No.	Horizontal M ± 2σm (cm.)	Vertical M ± 2σm (cm.)	No.	Horizontal M ± 2σm (cm.)	Vertical M ± 2σm (cm.)
0— 9	48	0.81±0.04	0.55±0.04	24	0.79±0.06	0.56±0.06	72	0.80±0.04	0.56±0.04
10—19	44	0.96±0.04	0.74±0.04	41	0.95±0.04	0.72±0.04	85	0.96±0.04	0.73±0.02
20—29	27	1.05±0.06	0.84±0.04	24	1.01±0.08	0.80±0.06	51	1.03±0.04	0.82±0.04
30—39	37	1.09±0.06	0.83±0.04	64	1.06±0.04	0.85±0.02	101	1.07±0.02	0.84±0.02
40—49	31	1.10±0.06	0.84±0.04	45	1.05±0.04	0.86±0.04	76	1.07±0.04	0.85±0.02
50—59	36	1.08±0.06	0.84±0.04	33	1.11±0.06	0.90±0.04	69	1.10±0.04	0.87±0.02
60+	36	1.10±0.06	0.86±0.04	35	1.17±0.08	0.95±0.04	71	1.13±0.06	0.91±0.02
20+	167	1.08±0.03	0.84±0.02	201	1.08±0.02	0.87±0.02	368	1.08±0.02	0.86±0.02
Total	259	1.01±0.02	0.77±0.02	266	1.03±0.02	0.82±0.02	525	1.02±0.02	0.80±0.02

Measurement Unit: Centimeters Horizontal: Tuberculum sellae to dorsum sellae
Vertical: Greatest depth of pituitary fossa

Over 20 years of age, the mean horizontal diameter of all males and females was 1.08 cm. The mean vertical diameter in males and females over age 20 was 0.86 cm. Differences in the measurements between males and females were not statistically significant.

Table II shows maximum and minimum horizontal and vertical measurements of the pituitary fossa in millimeters, by age groups, sexes combined, as determined in this study.

Table II: Range of Normal Measurements of Pituitary Fossa

Age Groups	No. of Patients	Horizontal (mm.)		Vertical (mm.)	
		Maximum	Minimum	Maximum	Minimum
0- 9	72	11.2	4.8	8.5	2.5
10-19	85	12.9	6.3	10.2	4.6
20-29	51	13.6	7.0	10.9	5.9
30-39	101	14.1	7.3	11.0	5.6
40-49	76	13.9	7.5	10.5	6.3
50-59	69	14.5	8.5	11.1	5.8
60+	71	15.9	6.7	11.2	6.0
20+	368	14.5	7.1	11.2	6.0
Total	525	14.3	6.1	11.1	4.3

Normal range is calculated as $M \pm 2\rho$

Over 20 years of age, the horizontal range was 7 to 14 mm; the vertical, 6 to 11 mm.

Table III compares measurements obtained in this study with those of other studies of this type.

Table III: Comparison Mean Measurements of Sella Turcica in Present and Other Studies

Series	Case	Diameter	
		Horizontal (cm.)	Vertical (cm.)
Kornblum, K[1].	1000	1.00	0.8
Heublein, G.W[4].	100	1.066	0.83
Camp, J.D[13].	500	1.006	0.81
Present Study	368	1.08	0.86
Nagayama, S[10].	115	1.267	0.83
Tamura, Y[14].	110	1.29	0.99

The horizontal and vertical diameters obtained were larger than those of Kornblum, Camp and Heublein, but smaller than those of Nagayama and Tamura.

Calcification of the petroclinoid and interclinoid ligaments is generally accepted as a physiological process. Table IV compares prevalence of interclinoid calcification in this study with prevalence reported in other studies.

Table IV: Comparison of Prevalence of Interclinoid Calcification in Present and Other Studies

Author	Number of Cases	Number of Cases with Calcification	Prevalence of Calcification (Per Cent)
Camp, J.D[13].	110	6	5.5
Heublein, G.W[4].	100	7	7.0
Present Study	368	11	3.0

Interclinoid calcification was noted in 5 male and 6 female subjects of the 368 adult cases. Prevalence for both sexes combined was 3%. This value is less than those arrived at in studies conducted in other countries. Prevalence of petroclinoid calcification in both sexes was 4.4% in this study.

DISCUSSION

Francis[16] studied the sella turcica of 418 fetal cases and reported that the horizontal diameter of the sella turcica increased remarkably beginning 24 weeks before birth. No differences in dimension were noted between males and females, nor had the dimensions and shape of the sella turcica any relation to the length of the fetus.

Silverman[15] studied the development of the sella turcica from infancy to adulthood and reported that under 13 years of age the measurements of the sella turcica of boys were larger than those of girls, but the converse applied over 13 years. He also reported a probable association between the dimension of the sella turcica and the height of the individual. Muroya[7] studied the development of the sella turcica of 326 cases including newborns and children under 15 years. He reported that the horizontal and vertical diame-

ters increased rapidly until 1 year of age and then increased gradually until 5 years, but no significant increase thereafter. He found no correlation between the shape of the skull and the sella turcica. Francis[16] reported that the dimensions of the sella turcica over 18 years of age remain constant, roentgenographically. He further concluded that the horizontal and vertical diameters of the sella turcica of Negroes are larger than those of Caucasians at all ages. This suggests that the dimension of the sella turcica differs according to race. Nagayama[10] investigated the relation between the dimension of sella turcica of adult Japanese women and their height, weight and chest circumference, and found no correlations.

In the present study, the horizontal and vertical measurements of the sella turcica were smaller than those of Japanese subjects so far reported but larger than those reported in Europe and in the United States. The differences appear to be more the horizontal than the vertical diameters, the latter being nearly the same in all studies cited in Table III. At the same time, studies which suggested a relatively large difference between sella sizes in Japan and the United States and European countries[10,14] were based on relatively small numbers of subjects. The results of the present study, based on a relatively large number of subjects, more closely approximate those of studies in the United States. Comparison of the latter and the present study fails to support a racial difference. In the present study, no differences were noted between measurements of males and females. The normal ranges of measurements for individuals 20 years of age and over were found to be 7 mm to 14 mm for the horizontal and 6 mm to 11 mm for the vertical.

SUMMARY

The horizontal and vertical measurements of the sella turcica were determined from 525 consecutive roentgenographic examinations of the skull interpreted as normal, and classified by age and sex. The values obtained were less than those reported in other studies of Japanese subjects heretofore, but higher than values reported in Western populations. These differences in values between Japanese subjects in the present study and Western subjects were not of a magnitude to support a racial difference. No differences were demonstrated in the dimensions of the sella turcica by sex.

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