

CT 1

:
: 109 (: 29 -15)
1mm CT ,
18 5
: 1-2

. Intersphenoidal
syn- chondrosis, intrapresphenoidal synchondrosis, intrapostsphenoidal synchondrosis
grade 4
sphenosquamal, sphenothmoidal, frontosphenoidal 3
가 가
6 Kerckring-supraoccipital synchondrosis
occipitomastoidal suture petro-occipital
synchondrosis 가
:
,
가

(sphenoid bone) (occipital bone)
(frontal bone), (ethmoid bone),
(temporal bone) (central
skull base) (membranous bone) (cartilage-
nous bone) , 25 / CT
(ossification center)

(1-3). (suture) (synchon-
drosis) .
(1). 18
70:39 29 15 (Table 1). CT
Hispeed Advantage(GE Medical Systems, Milwau- kee, Wis,
U.S.A.) (high spatial frequency
algorithm) (orbitomeatal line)
(foramen magnum) (orbital roof)
1mm

(thin-section)
CT
Kerckring-supraoccipital synchondrosis(KSS),
exoccipital-supraoccipital synchondrosis(ESS), occipitomastoidal
suture(OMS), basioccipital-exoccipital synchondrosis(BES),
petro-occipital synchondrosis(POS), sphenothmoidal
synchondrosis(SOS) 6 (Fig. 1),
anterior presphenoido-orbital synchondro-

(pneumatiza-
tion)가
가
가 . CT

sis(APOS), posterior presphenoido-orbital synchondrosis(PPOS), intersphenoidal synchondrosis (ISS), intrapresphenoidal synchondrosis(IPRES), intrapostsphenoidal synchondrosis(IPOS), rostrum-ossicles of Bertin synchondrosis(ROB), lateromedial postsphenoidal synchondrosis(LMPS), basisphenoidal-alisphenoidal synchondrosis(BAS), sphenosquamal suture (SSS), sphenothmoidal suture(SES), frontosphenoidal suture(FSS), inter-planum sphenoidale(IPS) 12 (Fig. 2A, B).

low grade (grade 1, 2, 3)
high grade(grade 4, 5)

CT
Elster (1)가
(Fig. 3). Grade 1
Madeline
Grade 1-5 5
, grade 2
가 (osseous bridge)가
, grade 3 /
, grade 4
(sclerotic margin)가
, grade 5

Table 1. Subject Demographics

Age	Number of Subjects	
	Boys	Girls
< 3 mo	3	0
< 6 mo	4	2
< 12 mo	3	4
< 2 yrs	9	6
< 4 yrs	6	9
< 6 yrs	12	4
< 10 yrs	19	8
< 16 yrs	14	6
Total	70	39

CT

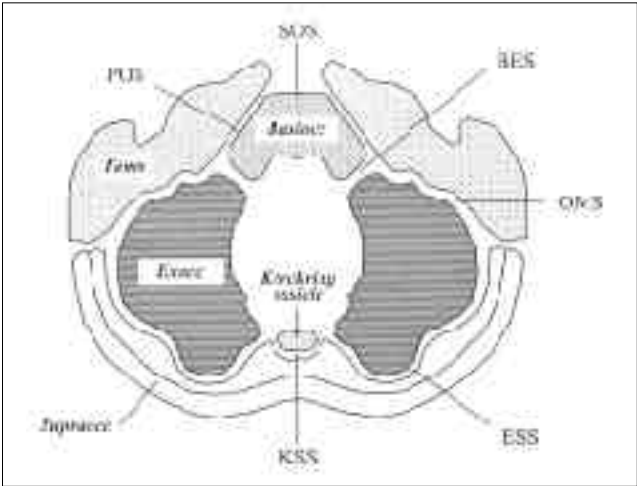
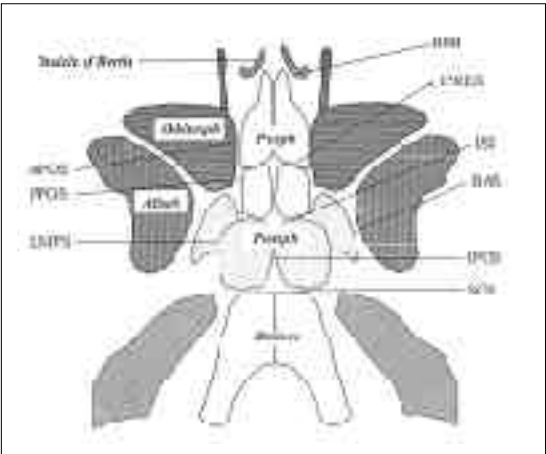


Fig. 1. Components of the occipital bone at birth with corresponding sutures and synchondroses. Basiocc = basioccipital bone, Exocc = exoccipital bone, Supraocc = supraoccipital bone, Temp = temporal bone, BES = basioccipital-exoccipital synchondrosis, ESS = exoccipital-supraoccipital synchondrosis, KSS = Kerckring-supraoccipital synchondrosis, OMS = occipitomastoidal suture, POS = petro-occipital synchondrosis, SOS = spheno-occipital synchondrosis.



A
postsphenoidal synchondrosis, IPRES= intrapresphenoidal synchondrosis, IPS= inter-planum sphenoidale, ISS= intersphenoidal synchondrosis, LMPS= lateromedial postsphenoidal synchondrosis, PPOS= posterior presphenoido-orbital synchondrosis, ROB= rostrum-ossicles of Bertin synchondrosis, SSS= sphenosquamal suture, SES= sphenothmoidal suture.

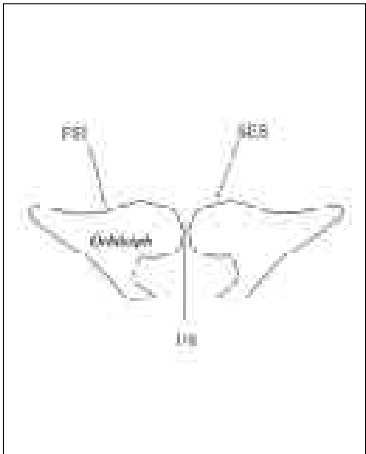


Fig. 2. Components of the sphenoid bone at birth with corresponding sutures and synchondroses at level of middle orbit (A) and upper orbit (B). The superomedial extension of the orbitosphenoid (B) extends across the superior aspect of the anterior accessory center of the presphenoid to form a prejugal ridge. Alisph= alisphenoid, Basiocc= basioccipital bone, Orbitosph= orbitosphenoid, Postsph= postsphenoid, Presph = presphenoid, APOS= anterior presphenoido-orbital synchondrosis, BAS= basisphenoidal-alisphenoidal synchondrosis, FSS= frontosphenoidal suture, IPOS= intra-

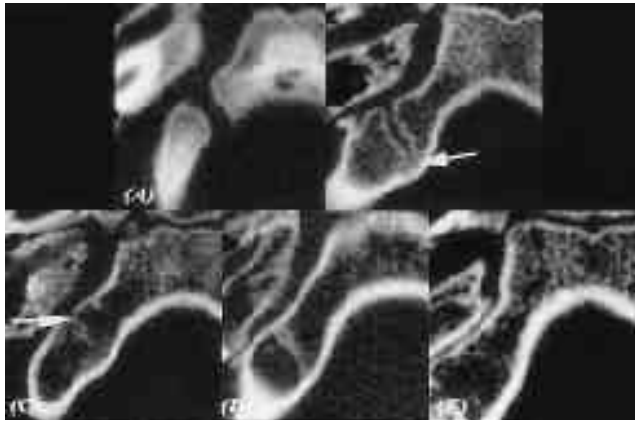


Fig. 3. Five-tier scheme for grading sutural or synchondrosal closure is illustrated along the basioccipital-exoccipital synchondrosis on CT scans.

(A) Grade 1. Margins of the synchondrosis(suture) are clearly separated on all sections.

(B) Grade 2. Clear separation of the synchondrosis is seen on most sections, but some areas are indistinct or suspicious for osseous bridge (arrow).

(C) Grade 3. Area of fusion or bridging (arrow) across a portion of the synchondrosis is definitely seen.

(D) Grade 4. Complete fusion of the synchondrosis with remnant sclerotic margins is seen.

(E) Grade 5. Complete closure is seen with no apparent vestige remaining.

Table 2-Table 5

6		(Fig.1)
Kerckring-supraoccipital synchondrosis(KSS)		
Kerckring center		
(supraoccipital bone)		KSS
3	3	
grade 2	grade 3	low grade
1	3-6	low grade
	1, high grade	3
1	grade 4	1
		grade 5
(Fig. 1, 4, 5).		
Exoccipital-supraoccipital synchondrosis(ESS)		
(exoccipital portion)		(su-
praoccipital)		1-2
CT		2-4
high grade		4
high grade		(Fig. 1, 4, 5).
Occipitomastoidal suture(OMS)		
ESS		(mas-
toid portion)	(petrous portion)	

Table 2. Prevalence of Low Grade and High Grade Fusion in Boys*

Sutures or synchondroses	Number of subjects															
	< 3mo(n= 3)		< 6mo(n= 4)		< 12mo(n= 3)		< 2yrs(n= 9)		< 4yrs(n= 6)		< 6yrs(n= 12)		< 10yrs(n= 19)		< 16yrs(n= 14)	
	low	high	low	high	low	high	low	high	low	high	low	high	low	high	low	high
Related to occipital bone																
Kerckring-supraoccipital	2	1	1	3	0	3	0	9	0	6	0	12	0	19	0	14
Exoccipital-supraoccipital	3	0	4	0	3	0	9	0	4	2	0	12	0	19	0	14
Occipitomastoidal	3	0	4	0	3	0	9	0	6	0	12	0	18	1	13	1
Basioccipital-exoccipital	3	0	4	0	3	0	9	0	6	0	12	0	8	11	0	14
Petro-occipital	3	0	4	0	3	0	9	0	6	0	12	0	19	0	14	0
Spheno-occipital	3	0	4	0	3	0	9	0	6	0	12	0	19	0	12	2
Related to sphenoid bone																
Anterior presphenoido-orbital	1	2	0	4	1	2	0	9	0	6	0	12	0	19	0	14
Posterior presphenoido-orbital	0	3	0	4	0	3	0	9	0	6	0	12	0	19	0	14
Intersphenoidal	0	3	0	4	0	3	0	9	0	6	0	12	0	19	0	14
Intrapresphenoidal	2	1	1	3	2	1	2	7	3	3	1	11	0	19	0	14
Intrapostsphenoidal	1	2	0	4	0	3	2	7	1	5	1	11	0	19	0	14
Rostrum-ossicle of Bertin	3	0	4	0	3	0	7	2	1	5	0	12	0	19	0	14
Lateromedial postsphenoidal	2	1	0	4	0	3	0	9	0	6	0	12	0	19	0	14
Basisphenoidal-alisphenoidal	3	0	2	2	1	2	1	8	1	5	0	12	0	19	0	14
Sphenosquamosal	3	0	4	0	3	0	9	0	6	0	12	0	19	0	14	0
Sphenoethmoidal	3	0	4	0	3	0	9	0	5	1	12	0	10	9	2	12
Frontosphenoidal	3	0	4	0	3	0	9	0	6	0	12	0	11	8	2	12
Inter-planum sphenoidale	3	0	2	2	1	2	0	9	0	6	0	12	0	19	0	14

*Low grade fusion consists of grade 1, 2, and 3, and high grade fusion consists of grade 4 and 5. Grade of fusion was determined by five-tier scheme for grading sutural or synchondrosal closure.

CT

(Fig. 1, 4, 5).

Sutures or synchondroses	Number of subjects															
	< 3mo(n= 0)		< 6mo(n= 2)		< 12mo(n= 4)		< 2yrs(n= 6)		< 4yrs(n= 9)		< 6yrs(n= 4)		< 10yrs(n= 8)		< 16yrs(n= 6)	
	low	high	low	high	low	high	low	high	low	high	low	high	low	high	low	high
Related to occipital bone																
Kerckring-supraoccipital	-	-	1	1	0	4	1	5	0	9	0	4	0	8	0	6
Exoccipital-supraoccipital	-	-	2	0	4	0	6	0	7	2	1	3	2	6	0	6
Occipitomastoidal	-	-	2	0	4	0	6	0	9	0	4	0	8	0	6	0
Basioccipital-exoccipital	-	-	2	0	4	0	6	0	9	0	4	0	2	6	0	6
Petro-occipital	-	-	2	0	4	0	6	0	9	0	4	0	8	0	6	0
Spheno-occipital	-	-	2	0	4	0	6	0	9	0	4	0	8	0	6	2
Related to sphenoid bone																
Anterior presphenoido-orbital	-	-	0	2	0	4	0	6	0	9	0	4	0	8	0	6
Posterior presphenoido-orbital	-	-	0	2	0	4	0	6	0	9	0	4	0	8	0	6
Intersphenoidal	-	-	0	2	0	4	0	6	0	9	0	4	0	8	0	6
Intrapresphenoidal	-	-	2	0	1	3	1	5	0	9	0	4	0	8	0	6
Intrapostsphenoidal	-	-	0	2	1	3	1	5	1	8	0	4	0	8	1	5
Rostrum-ossicle of Bertin	-	-	2	0	3	1	3	3	0	9	0	4	0	8	0	6
Lateromedial postsphenoidal	-	-	1	1	0	4	0	6	0	9	0	4	0	8	0	6
Basisphenoidal-alisphenoidal	-	-	0	2	0	4	0	6	0	9	0	4	0	8	0	6
Sphenosquamosal	-	-	2	0	4	0	6	0	9	0	4	0	8	0	6	0
Sphenoethmoidal	-	-	2	0	4	0	6	0	9	0	4	0	5	3	0	6
Frontosphenoidal	-	-	2	0	4	0	6	0	9	0	4	0	6	2	1	5
Inter-planum sphenoidale	-	-	1	1	0	4	0	6	0	9	0	4	0	8	0	6

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Table 4. Average Scores of Sutural or Synchrondrosal Closure in Boys According to Each Age Groups

Sutures or synchrondroses	CT scores (average \pm standard deviation)							
	< 3mo(n= 3)	< 6mo(n= 4)	< 12mo(n= 3)	< 2yrs(n= 9)	< 4yrs(n= 6)	< 6yrs(n= 12)	< 10yrs(n= 19)	< 16yrs(n= 14)
Related to occipital bone								
Kerckring-supraoccipital	3.00 \pm 1.00	4.00 \pm 0.82	4.67 \pm 0.58	5.00 \pm 0.00	4.83 \pm 0.41	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
exooccipital	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.67 \pm 0.53	3.00 \pm 1.41	4.27 \pm 0.45	4.63 \pm 0.51	4.93 \pm 0.28
-supraoccipital								
Occipitomastoidal	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.17 \pm 0.40	1.83 \pm 0.38	2.21 \pm 0.63	2.33 \pm 0.52
basioccipital-exoccipital	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.11 \pm 0.33	1.17 \pm 0.41	2.17 \pm 0.83	3.63 \pm 0.76	4.29 \pm 0.47
Petro-occipital	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.37 \pm 0.49	2.14 \pm 0.36
Spheno-occipital	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.16 \pm 0.37	2.25 \pm 0.93
Related to sphenoid bone								
Anterior								
presphenoido-orbital	3.67 \pm 0.58	4.25 \pm 0.58	3.67 \pm 0.58	4.56 \pm 0.52	4.83 \pm 0.40	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
Posterior								
presphenoido-orbital	4.00 \pm 0.00	4.75 \pm 0.50	4.67 \pm 0.58	4.67 \pm 0.50	4.67 \pm 0.51	4.92 \pm 0.28	5.00 \pm 0.00	5.00 \pm 0.00
Intersphenoidal	4.00 \pm 0.00	4.25 \pm 0.50	4.00 \pm 0.00	4.33 \pm 0.50	4.33 \pm 0.51	4.92 \pm 0.28	5.00 \pm 0.00	5.00 \pm 0.00
Intrapresphenoidal	3.00 \pm 1.00	4.25 \pm 1.50	3.33 \pm 0.58	4.11 \pm 0.78	3.5 \pm 0.54	4.83 \pm 0.57	5.00 \pm 0.00	5.00 \pm 0.00
Intrapostsphenoidal	4.00 \pm 1.73	5.00 \pm 0.00	5.00 \pm 0.00	4.56 \pm 0.88	4.67 \pm 0.81	5.00 \pm 0.00	4.95 \pm 0.45	5.00 \pm 0.00
Rostrum-ossicle of Bertin	1.33 \pm 0.58	1.50 \pm 0.58	2.33 \pm 0.58	2.78 \pm 1.05	4.67 \pm 0.81	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
Lateromedial								
postsphenoidal	3.33 \pm 0.58	4.40 \pm 0.89	4.67 \pm 0.58	4.78 \pm 0.44	5.00 \pm 0.00	4.75 \pm 0.45	4.95 \pm 0.45	5.00 \pm 0.00
Basisphenoidal								
-alisphenoidal	2.33 \pm 0.58	3.25 \pm 0.95	3.67 \pm 0.58	4.22 \pm 0.66	4.83 \pm 0.38	4.83 \pm 0.32	4.89 \pm 0.32	4.87 \pm 0.36
Sphenosquamosal	1.33 \pm 0.58	1.25 \pm 0.50	1.67 \pm 0.58	2.00 \pm 0.50	2.00 \pm 0.00	2.17 \pm 0.39	2.50 \pm 0.51	2.71 \pm 0.49
Sphenoethmoidal	1.33 \pm 0.58	1.5 \pm 0.58	2.00 \pm 0.00	2.00 \pm 0.00	2.50 \pm 0.83	2.88 \pm 0.38	3.53 \pm 0.61	4.57 \pm 0.75
Frontosphenoidal	1.33 \pm 0.58	1.75 \pm 0.50	2.00 \pm 0.00	2.33 \pm 0.50	2.50 \pm 0.54	2.50 \pm 0.52	3.53 \pm 0.69	4.36 \pm 0.74
Inter-planum sphenoidale	1.33 \pm 0.58	3.50 \pm 1.29	4.00 \pm 1.00	4.50 \pm 0.44	5.00 \pm 0.00	5.00 \pm 0.00	4.95 \pm 0.22	5.00 \pm 0.00

Table 5. Average Scores of Sutural or Synchrondrosal Closure in Girls According to Each Age Groups

Sutures or Synchrondroses	CT scores (average \pm standard deviation)							
	< 3mo(n= 0)	< 6mo(n= 2)	< 12mo(n= 4)	< 2yrs(n= 6)	< 4yrs(n= 9)	< 6yrs(n= 4)	< 10yrs(n= 8)	< 16yrs(n= 6)
Related to occipital bone								
Kerckring-supraoccipital	-	3.00 \pm 1.41	4.50 \pm 0.58	4.50 \pm 0.83	4.90 \pm 0.33	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
exooccipital-supraoccipital	-	1.50 \pm 0.71	1.25 \pm 0.50	1.83 \pm 0.75	3.11 \pm 0.60	3.75 \pm 0.50	4.12 \pm 0.83	4.83 \pm 0.41
Occipitomastoidal	-	1.00 \pm 0.00	1.00 \pm 0.00	1.17 \pm 0.41	2.00 \pm 0.00	2.00 \pm 0.00	2.25 \pm 0.46	2.83 \pm 0.41
basioccipital-exoccipital	-	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.44 \pm 0.53	2.75 \pm 0.50	3.75 \pm 0.46	4.17 \pm 0.41
Petro-occipital	-	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.75 \pm 0.46	2.50 \pm 0.54
Spheno-occipital	-	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.00 \pm 0.00	1.25 \pm 0.50	1.25 \pm 0.52	2.50 \pm 0.54
Related to sphenoid bone								
Anterior presphenoido	-	4.50 \pm 0.70	4.50 \pm 0.54	4.33 \pm 0.54	4.86 \pm 0.37	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
-orbital								
Posterior presphenoido	-	4.50 \pm 0.70	4.75 \pm 0.50	4.67 \pm 0.52	4.78 \pm 0.44	5.00 \pm 0.00	4.87 \pm 0.35	5.00 \pm 0.00
-orbital								
Intersphenoidal	-	4.00 \pm 0.00	4.00 \pm 0.00	4.33 \pm 0.52	4.78 \pm 0.44	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
Intrapresphenoidal	-	4.00 \pm 0.00	4.00 \pm 1.41	4.33 \pm 0.81	4.89 \pm 0.33	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
Intrapostsphenoidal	-	5.00 \pm 0.00	4.25 \pm 0.95	4.50 \pm 0.83	4.67 \pm 0.71	5.00 \pm 0.00	5.00 \pm 0.00	4.60 \pm 0.89
Rostrum-ossicle of Bertin	-	2.50 \pm 0.70	2.50 \pm 1.00	3.17 \pm 1.15	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00
Lateromedial								
postsphenoidal	-	3.50 \pm 0.70	4.5 \pm 0.58	4.83 \pm 0.41	4.89 \pm 0.33	4.75 \pm 0.50	4.75 \pm 0.46	4.83 \pm 0.41
Basisphenoidal								
-alisphenoidal	-	4.00 \pm 0.00	4.00 \pm 0.00	4.67 \pm 0.52	4.71 \pm 0.48	5.00 \pm 0.00	4.75 \pm 0.46	5.00 \pm 0.00
Sphenosquamosal	-	1.50 \pm 0.70	1.50 \pm 0.57	1.83 \pm 0.41	2.11 \pm 0.35	2.50 \pm 0.58	2.87 \pm 0.35	2.83 \pm 0.41
Sphenoethmoidal	-	2.00 \pm 0.00	2.00 \pm 0.00	2.00 \pm 0.00	2.89 \pm 0.33	3.00 \pm 0.00	3.38 \pm 0.52	4.67 \pm 0.52
Frontosphenoidal	-	2.00 \pm 0.00	2.00 \pm 0.00	2.00 \pm 0.00	2.56 \pm 0.52	2.22 \pm 0.50	3.12 \pm 0.64	3.83 \pm 0.41
Inter-planum sphenoidale	-	3.00 \pm 1.41	3.75 \pm 1.50	4.50 \pm 0.54	4.89 \pm 0.33	5.00 \pm 0.00	5.00 \pm 0.00	5.00 \pm 0.00

Fig. 6. Axial CT scan of the sphenoid bone in same infant as in Fig. 5. The posterior presphenoido-orbital synchondrosis (small single arrows) shows early high grade fusion with some sclerotic remnants. The intersphenoidal synchondrosis (small double arrows) and intrapostsphenoidal synchondrosis (long arrow) have completely fused without remnant. However, the intrapresphenoidal synchondrosis (large double arrows) remains partially open (grade 3), which fuses last among three synchondroses within the sphenoidal body. Note the widely open speno-occipital synchondrosis (large single arrows) posterior to the postsphenoid.



Fig. 9. Axial CT scan in a 1 year-old boy. The rostrum-ossicle of Bertin synchondrosis (long arrow) shows low grade fusion (grade 2). Note the paired ossicles of Bertin (small arrows). The sphenoquamosal suture (arrows) shows its complex and interwoven appearance with the sclerotic remnants along the suture.

2	grade 5	. 2	Sphenoethmoidal suture(SES)	(ethmoid bone)	1
ossicle of Bertin		가			
		(Fig.			
9).			low grade	6-10	
Lateromedial postsphenoidal and basisphenoidal-alisphenoidal syn-			high grade	10	high
chondroses(LMPS BAS)			grade	2	grade 2가, 2-
LMPS	(medial center)	(lat-	8 grade 3, 9	grade 4	(Fig. 2B,
eral center)	2 3				11).
1 6	grade 3 low grade		Frontosphenoidal suture(FSS)		
	high grade		FSS SES		
3-6	4.40 ± 0.89,		SES		
4.50 ± 0.58	(Fig. 2, 10A, 10B). BAS LMPS		6 low grade , 6-10		
(pterygoid process)			high grade 10	high grade	
noid)	LMPS	(alisphe-	. SES	4	
2	grade 4 high		grade 2가, 4-10	grade 3, 10	grade 4
grade	(Fig 2. 10A, 10B).		5가 (Fig. 2B, 12).		
Sphenosquamosal suture(SSS)			Inter-planum sphenoidale(IPS)		
(greater wing)	(squamous		(jugum sphenoidale)	. 3	2
temporal bone)			10 1	grade 1	1
grade 3			grade 4	high grade	
	. 10-15		1-2		4.50 ± 0.44,
2.71 ± 0.49 2.83 ± 0.41	(Fig. 2, 9, 10A, 10B).		4.50 ± 0.54	(Fig. 2B, 11).	



A



B

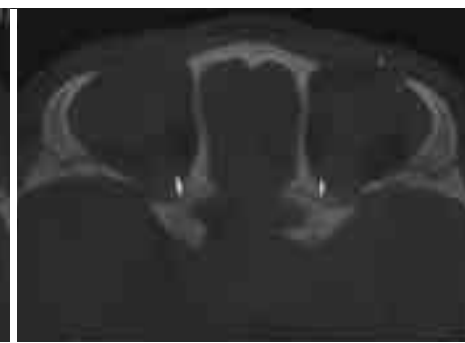
Fig. 10. The lateromedial postsphenoidal synchondrosis and basisphenoidal-alisphenoidal synchondrosis.

A. Axial CT scan in a 2-month-old male infant shows fusion of the lateromedial postsphenoidal synchondrosis (arrows) earlier than that of the basisphenoidal-alisphenoidal synchondrosis (small double arrows).

B. Axial CT scan in a 3-year-old girl shows complete fusion of both synchondroses.



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Fig. 11. Axial CT scan shows grade 2 fusion of the sphenoethmoidal suture (short arrows) and interplanum sphenoidale (long arrow) in a 5-month-old female infant.

Fig. 12. Axial CT scan shows grade 2 fusion of the frontosphenoidal suture (arrows) in a 5-month-old female infant.

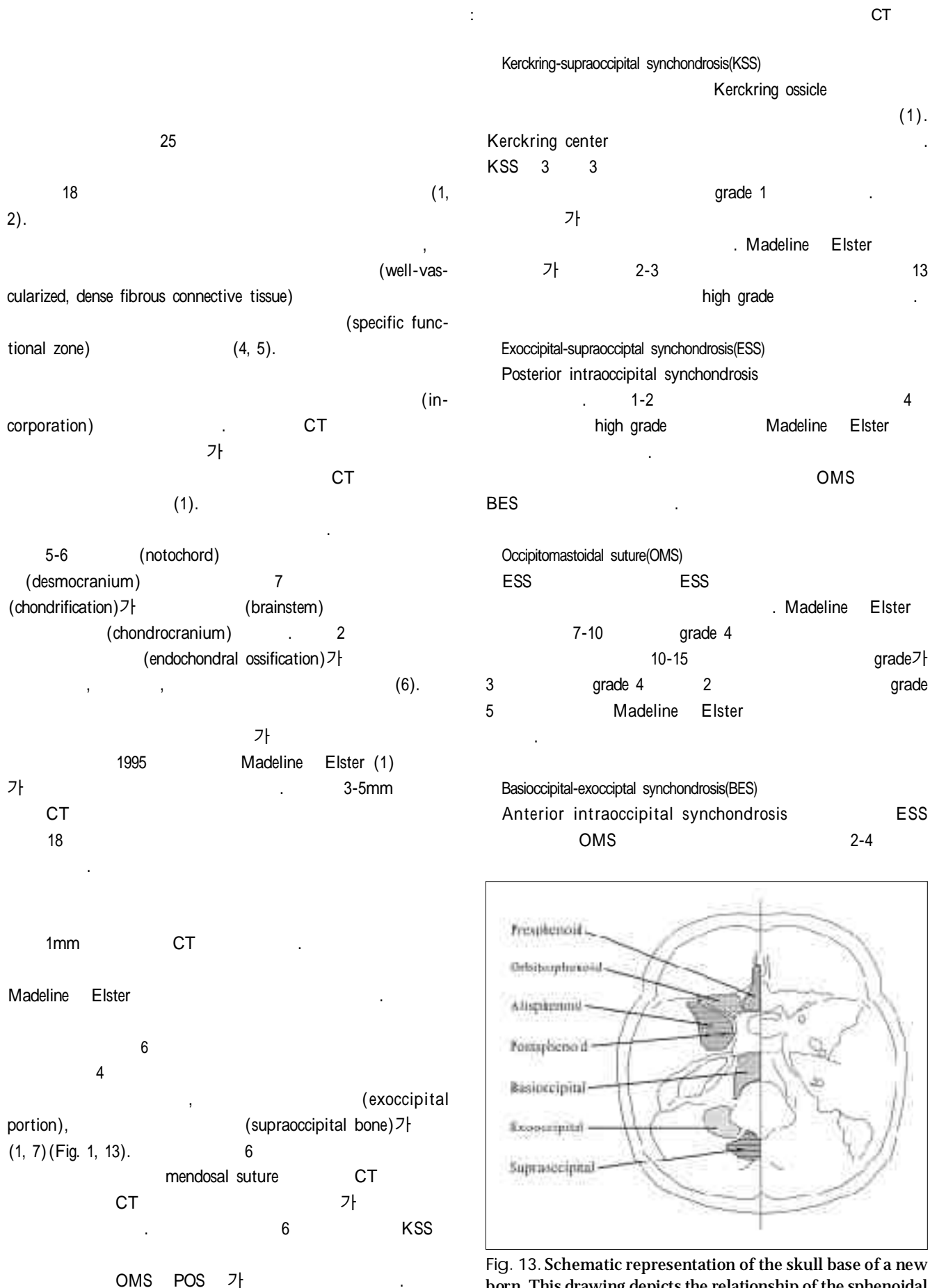


Fig. 13. Schematic representation of the skull base of a newborn. This drawing depicts the relationship of the sphenoidal and occipital centers to their neighboring structures.

Category	Madeline	Elster	Other
Petro-occipital synchondrosis (POS)	high grade	18	grade 4
Spheno-occipital synchondrosis (SOS)	POS grade 4	grade 5	CT 8-13
Intersphenoidal, Intrapresphenoidal, and intrapostsphenoidal synchondroses (ISS, IPRES, IPOS)	Elster 3	high grade	ISS grade 4
Rostrum-ossicles of Bertin synchondrosis (ROB)	ROB grade 4	1-2	3
Lateromedial postsphenoidal and basisphenoidal-alisphenoidal synchondroses (LMPS, BAS)	Elster 6	5.3	LMPS grade 4

[illegible]

Normal Development of Sutures and Synchondroses in the Central Skull Base : CT Study¹

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Purpose : To evaluate the developmental patterns of the sutures and synchondroses in the central skull base.

Materials and Methods : We evaluated the CT scans of 109 children (age range, 29 days to 15 years) with no skull base abnormality who had undergone axial CT of the skull base with 1-mm collimation. Using a five-tier scheme, we analyzed the developmental patterns of the 18 sutures and synchondroses related to the sphenoid and occipital bones.

Results : Fusion of the sutures and synchondroses related to the sphenoid bone progressed rapidly during the first two years. Thereafter, changes in the sphenoid bone were dominated by pneumatization of the sphenoid sinus. Fusion of the synchondroses within the sphenoid body, including intersphenoidal, intrapresphenoidal, and intrapostsphenoidal synchondrosis occurred early and in most cases was graded 4. Fusion of the sphenosquamosal, sphenothmoidal, and frontosphenoidal sutures was delayed, and residual sclerosis was a common finding. Except for Kerckring-supraoccipital synchondrosis, fusion of the six sutures and synchondroses related to the occipital bone occurred more gradually than that of those related to the sphenoid bone. Among these, fusion of the occipitomastoidal suture and petro-occipital synchondrosis was the last to occur.

Conclusion : A knowledge of the developmental patterns of sutures and synchondroses can help differentiate normal conditions from those such as fracture, osseous dysplasia, or congenital malformation, which are abnormal. Our results provide certain basic informations about skull base maturity in children.

Index words : Skull, anatomy
Skull, CT
Skull, growth and development

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ISMRM	The 8th International Society for Magnetic Resonance	00. 4. 1()- 7()	Denver, Colorado
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