

## CHAPTER IV

### RESULTS

The data in each wall of the orbit will be described as follows.

#### **Medial wall**

The medial wall measurements were taken from the midpoint of anterior lacrimal crest ( as the constant landmark ) to the crest or foramina within the orbit and among these foramina. The means and standard deviations are shown in Table 2.

Each medial wall contained the anterior and posterior ethmoidal foramina. The average distance from the constant landmark to the anterior ethmoidal foramen was  $23.49 \pm 2.64$  mm. The most common location of the anterior ethmoidal foramina was at the frontoethmoid suture line. Only 15 % of this foramen was located superiorly to this suture line at the distance of  $1.95 \pm 0.70$  mm. Sixty - two orbits had more than one posterior ethmoidal foramen. The average distance from the constant landmark to the farthest posterior ethmoidal foramen was  $35.96 \pm 2.47$  mm. With reference to the posterior ethmoidal foramen, the optic canal could be found at  $6.26 \pm 1.60$  mm posteriorly in average.

Comparison between genders and sides of the distances measured in the medial wall is shown in Table 3. Related to the side, there were significant differences in the average distance from the anterior lacrimal crest to the posterior lacrimal crest, the average distance from the anterior lacrimal crest to the anterior ethmoidal foramen and the average distance from the anterior lacrimal crest to the posterior ethmoidal foramen between two sides regardless of

gender. Between two sides in female, there were significant differences in the average distance from the anterior lacrimal crest to the anterior ethmoidal foramen, the average distance from the anterior lacrimal foramen to the posterior ethmoidal foramen and the average distance from the anterior ethmoidal foramen to the optic canal. Regarding to the gender, there was significant difference in the distance from the anterior lacrimal crest to the posterior lacrimal crest between both genders in right side.

**Table 2 : The distances measured in the medial wall of the orbits ( n = 100 )**

<b>The distance</b>	<b>Mean ± SD (mm)</b>
<b>1. anterior lacrimal crest - posterior lacrimal crest</b>	<b>6.65 ± 1.00</b>
<b>2. anterior lacrimal crest - anterior ethmoidal foramen</b>	<b>23.49 ± 2.64</b>
<b>3. anterior lacrimal crest - posterior ethmoidal foramen ( farthest )</b>	<b>35.96 ± 2.47</b>
<b>4. anterior lacrimal crest - optic canal ( medial aspect )</b>	<b>42.18 ± 2.33</b>
<b>5. anterior ethmoidal foramen - optic canal ( medial aspect )</b>	<b>19.44 ± 1.97</b>
<b>6. anterior ethmoidal foramen - posterior ethmoidal foramen (farthest)</b>	<b>13.19 ± 1.98</b>
<b>7. posterior ethmoidal foramen - optic canal ( medial aspect )</b>	<b>6.26 ± 1.60</b>
<b>8. anterior ethmoidal foramen above frontoethmoid suture line*</b>	<b>1.95 ± 0.70</b>

\* It was found only in 15 orbits.

**Table 3 : Comparison between genders and sides of the distances measured in the medial wall of the orbit**

The distance	Total (n=100)		Male (n=50)		Female (n=50)	
	Mean ± SD (mm)		Mean ± SD (mm)		Mean ± SD (mm)	
	Lt. side (n=50)	Rt. side (n=50)	Lt. side (n=25)	Rt. side (n=25)	Lt. side (n=25)	Rt. side (n=25)
1. ALC - PLC	6.51 ± 1.14	6.80 ± 0.84 <sup>a</sup>	6.75 ± 1.29	7.06 ± 0.81	6.27 ± 0.94	6.53 ± 0.80 <sup>d</sup>
2. ALC - AEF	23.11 ± 2.57	23.86 ± 2.68 <sup>b</sup>	23.62 ± 2.66	24.28 ± 2.97	22.60 ± 2.41	23.43 ± 2.34 <sup>c</sup>
3. ALC - PEF	35.58 ± 2.35	36.39 ± 2.56 <sup>b</sup>	35.52 ± 2.56	36.13 ± 2.92	35.64 ± 2.16	36.54 ± 2.18 <sup>c</sup>
4. ALC - OC	42.10 ± 2.06	42.27 ± 2.59	41.84 ± 2.52	42.34 ± 3.05	42.36 ± 1.47	42.20 ± 2.08
5. AEF - OC	19.62 ± 2.00	19.26 ± 1.94	19.21 ± 2.03	19.30 ± 1.75	20.04 ± 1.93	19.22 ± 2.15 <sup>c</sup>
6. AEF - PEF	13.16 ± 2.00	13.23 ± 1.98	12.69 ± 2.28	12.72 ± 2.11	13.65 ± 1.58	13.73 ± 1.73
7. PEF - OC	6.26 ± 1.66	6.25 ± 1.56	6.50 ± 1.29	6.52 ± 1.49	6.03 ± 1.97	5.98 ± 1.62

**a** p < 0.05 vs left side

**b** p < 0.01 vs left side

**C** p < 0.05 vs female on the left

**d** p < 0.05 vs male on the right

( In details, see Appendix B )

ALC = anterior lacrimal crest

PLC = posterior lacrimal crest

AEF = anterior ethmoidal foramen

PEF = posterior ethmoidal foramen ( farthest )

OC = optic canal ( medial aspect )

FESL = frontoethmoid suture line

### Superior wall or roof

The superior wall measurements were taken from the supraorbital foramen or notch to the superior orbital fissure, optic canal and lacrimal foramen. The means and standard deviations are shown in Table 4.

The average distance from the supraorbital foramen to the closest margin of superior orbital fissure was  $40.01 \pm 2.36$  mm and to the superior aspect of optic canal was  $44.65 \pm 2.33$  mm. The lacrimal foramen could be found only 37 %, composing of 20 left-side orbits ( 7 males and 13 females ) and 17 right-side orbits ( 10 males and 7 females ). Most of the lacrimal foramen was single foramen. The double foramina were detected in 5 orbits ( 1 left-side female and 4 right-side male ). If the double foramen were found, the only shorter distance was measured. The average distance from the supraorbital foramen to the lacrimal foramen was  $33.57 \pm 3.47$  mm.

Comparison between genders and sides of the distances measured in the superior wall is shown in Table 5. Related to the gender, there were significant differences in the average distance from the supraorbital foramen to the closest margin of superior orbital fissure and the average distance from the supraorbital foramen to the lateral aspect of optic canal between both genders in the right-side orbit. Regarding to the side, there were significant differences in the average distance from the supraorbital foramen to the lacrimal foramen between two sides in male and between two sides when both genders were combined.

**Table 4 : The distances measured in the roof of the orbits ( n = 100 )**

The distance	Mean ± SD (mm)
1. supraorbital notch or foramen - closest margin of superior orbital fissure	40.01 ± 2.36
2. supraorbital notch or foramen - optic canal ( superior aspect )	44.65 ± 2.33
3. supraorbital notch or foramen - lacrimal foramen *	33.57 ± 3.47

\* The lacrimal foramen could be found only in 37 orbits. If the double foramina were observed, the only shorter distance was measured.

**Table 5 : Comparison between genders and sides of the distances measured in the roof of the orbit**

The distance	Total (n=100)		Male (n=50)		Female (n=50)	
	Mean ± SD (mm)		Mean ± SD (mm)		Mean ± SD (mm)	
	Lt. side (n=50)	Rt. side (n=50)	Lt. side (n=25)	Rt. side (n=25)	Lt. side (n=25)	Rt. side (n=25)
1. SN(F) - SOF	39.84 ± 2.32	40.18 ± 2.41	40.06 ± 2.73	40.89 ± 2.37	39.63 ± 1.85	39.46 ± 2.27 <sup>C</sup>
2. SN(F) - OC	44.84 ± 2.42	44.46 ± 2.24	45.39 ± 2.75	45.15 ± 2.32	44.29 ± 1.94	43.77 ± 1.98 <sup>C</sup>
	Total (n=37)		Male (n=17)		Female (n=20)	
	Lt. side (n=20)	Rt. side (n=17)	Lt. side (n=7)	Rt. side (n=10)	Lt. side (n=13)	Rt. side (n=7)
3. SN(F) – LF*	32.65 ± 3.45	34.65 ± 3.28 <sup>a</sup>	32.17 ± 2.30	35.27 ± 3.46 <sup>b</sup>	32.91 ± 4.00	33.76 ± 3.02

\* If the double foramina were appeared, the only shorter distance was calculated.

**a** P < 0.05 vs left side

**b** P < 0.05 vs male on the left

**C** P < 0.05 vs male on the right ( In details, see Appendix B )

SN(F) = supraorbital notch or foramen                      OC = optic canal ( superior aspect )

SOF = closest margin of superior orbital fissure      LF = lacrimal foramen

**Inferior wall or floor**

The inferior wall measurements were taken from the orbital rim just above infraorbital foramen to the inferior orbital fissure, optic canal and posterior margin covering of the infraorbital nerve. The means and standard deviations are shown in Table 6.

The average distance from the orbital rim above the infraorbital foramen to the closest margin of inferior orbital fissure was  $21.67 \pm 1.96$  mm and to the inferior aspect of the optic canal was  $46.19 \pm 2.78$  mm. In all orbits, the infraorbital groove was not completely covered by a thin bony plate back to the inferior orbital fissure. The average distance of the bony cover was  $12.33 \pm 3.73$  mm.

Comparison between genders and sides of the distances measured in the inferior wall is shown in Table 7. No significant difference was found between genders and sides, except only one significant difference in the distance from the orbital rim above the infraorbital foramen to the posterior margin covering of the infraorbital nerve between left and right sides in male.

**Table 6 : The distances measured in the floor of the orbits ( n = 100 )**

The distance	Mean ± SD (mm)
1. orbital rim above infraorbital foramen - closest margin of inferior orbital fissure	21.67 ± 1.96
2. orbital rim above infraorbital foramen - optic canal ( inferior aspect )	46.19 ± 2.78
3. orbital rim above infraorbital foramen - posterior margin covering of infraorbital nerve	12.33 ± 3.73

**Table 7 : Comparison between genders and sides of the distances measured in the floor of the orbit**

The distance	Total (n=100) Mean ± SD (mm)		Male (n=50) Mean ± SD (mm)		Female (n=50) Mean ± SD (mm)	
	Lt. side (n=50)	Rt. side (n=50)	Lt. side (n=25)	Rt. side (n=25)	Lt. side (n=25)	Rt. side (n=25)
	1. IF - IOF	21.88 ± 2.08	21.46 ± 1.84	22.17 ± 0.44	21.85 ± 1.70	21.58 ± 2.11
2. IF - OC	45.85 ± 2.75	46.52 ± 2.80	46.45 ± 2.97	46.93 ± 2.82	45.25 ± 2.43	46.12 ± 2.78
3. IF - PM	12.40 ± 3.38	12.25 ± 4.08	12.34 ± 3.35	11.30 ± 3.64 <sup>a</sup>	12.47 ± 3.47	13.20 ± 4.36

**a** p < 0.05 vs male on the left

( In details, see Appendix B )

IF = orbital rim above infraorbital foramen

IOF = closest margin of inferior orbital fissure

OC = optic canal ( Inferior aspect )

PM = posterior margin covering of infraorbital nerve

## **Lateral wall**

The lateral wall measurements were taken from the frontozygomatic suture to the superior and inferior orbital fissures, optic canal and lacrimal foramen. The means and standard deviations are shown in Table 8.

The average distance from the frontozygomatic suture to the closest margin of the superior orbital fissure was  $34.50 \pm 2.55$  mm, to the closest margin of the inferior orbital fissure was  $23.96 \pm 2.31$  mm and to the lateral aspect of the optic canal was  $46.91 \pm 2.38$  mm. The lacrimal foramen could be found in some orbits, as described in the roof. The average distance from the frontozygomatic suture to the lacrimal foramen was  $27.16 \pm 3.69$  mm.

Comparison between genders and sides of the distances measured in the lateral wall was shown in Table 9. In combination of two genders, the average distances from the frontozygomatic suture to the closest margin of the inferior orbital fissure and from the frontozygomatic suture to the lateral aspect of optic canal were significantly different between left and right sides. Considering each gender, there was a significant difference in the distance from the frontozygomatic suture to the lateral aspect of optic canal between two sides in male. In female, a significant difference in the distance from the frontozygomatic suture to the closest margin of the inferior orbital fissure between two sides. Moreover, this distance in female was significantly shorter than in male only on the left side.



**Table 8 : The distances measured in the lateral wall of the orbits ( n = 100 )**

<b>The distance</b>	<b>Mean ± SD (mm)</b>
<b>1. frontozygomatic suture - closest margin of superior orbital fissure</b>	<b>34.50 ± 2.55</b>
<b>2. frontozygomatic suture - closest margin of inferior orbital fissure</b>	<b>23.96 ± 2.31</b>
<b>3. frontozygomatic suture - optic canal ( lateral aspect )</b>	<b>46.91 ± 2.38</b>
<b>4. frontozygomatic suture - lacrimal foramen *</b>	<b>27.16 ± 3.69</b>

\* The lacrimal foramen could be found only in 37 orbits. If the double foramina were seen, the only shorter distance was measured.

**Table 9 : Comparison between genders and sides of the distances measured in the lateral wall of the orbit**

The distance	Total (n=100) Mean ± SD (mm)		Male (n=50) Mean ± SD (mm)		Female (n=50) Mean ± SD (mm)	
	Lt. side (n=50)	Rt. side (n=50)	Lt. side (n=25)	Rt. Side (n=25)	Lt. side (n=25)	Rt. side (n=25)
	1. FZ - SOF	34.31 ± 2.50	34.70 ± 2.62	34.56 ± 2.66	35.02 ± 2.58	34.05 ± 2.36
2. FZ - IOF	23.24 ± 2.30	24.67 ± 2.11 <sup>a</sup>	23.94 ± 2.38	24.56 ± 2.12	22.54 ± 2.04 <sup>e</sup>	24.78 ± 2.14 <sup>d</sup>
3. FZ - OC	47.23 ± 2.22	46.59 ± 2.51 <sup>b</sup>	47.83 ± 2.65	46.80 ± 2.70 <sup>c</sup>	46.62 ± 1.51	46.37 ± 2.33
	Total (n=37)		Male (n=17)		Female (n=20)	
	Lt. side (n=20)	Rt. side (n=17)	Lt. side (n=7)	Rt. side (n=10)	Lt. side (n=13)	Rt. side (n=7)
4. FZ - LF *	26.32 ± 3.62	28.16 ± 3.61	25.16 ± 2.31	28.93 ± 4.27	26.94 ± 4.12	27.06 ± 2.24

\* If the double foramina were presented, the only shorter distance was measured.

**a**  $p < 0.001$  vs left side

**b**  $p < 0.05$  vs left side

**C**  $p < 0.01$  vs male on the left

**d**  $p < 0.001$  vs female on the left

**e**  $p < 0.05$  vs male on the left

( In details, see Appendix B )

FZ = frontozygomatic suture

SOF = closest margin of superior orbital fissure

IOF = closest margin of inferior orbital fissure

OC = optic canal ( lateral aspect )

LF = lacrimal foramen