**P 1-45**

## Value of the blink study with infraorbital stimulation in orbital wall fracture

Jae Sam Seo[1*], Young Sook Park[1†], Hyun Jung Chang[1], Jin Gee Park[1], Eun Sol Cho[1], Kyo Hun Ku[1], Chang Woo Kim[1], Se Hwi O[1]

Samsung Changwon Hosipital, Department of Rehabilitation Medicine[1]

**Objective**
This study aimed to find frequenct fracture site in orbital wall fracture and correlation beetween the fracture site and trigeminal neuropathy. In addition, we found the electrodiagnostic value of the blink study with infraorbital stimulation.

**Methods**
Between January 2016 and May 2019, 82 patients who underwent reduction surgery due to orbital wall fracture were evaluated. We classified the group based on the fracture site. The first group was patients suffered simple fracture and these group subdiveded by involved fracture site that superior, inferior, medial, lateral side. And then, the remaining patients with combined fractures were also subdivided by the fracture site. (Fig-1, Fig-2) We performed blink study in two different ways which one is supraorbital stimulation and the other is infraorbital stimulation. The value of study consists of each stimulation, details are as follows; ipsilateral R1, R2, contralateral R2 of fracture side and ipsilateral R1, R2, contralateral R2 of non-fracture side. In addition, we calculated R1 of fractured side - R1 of non-fracture side, R2 of fractured side - R2 of non-fracture side, R2 of fracture side - cR2 of non-fracture side. The indicated reference values were referred to Kimura. (Fig-3) At least one of the result value is higher than reference value was diagnosed as a trigeminal neuropathy.

**Result**
Of the 82 cases in total, there were 38 simple fractures; 2 of supraorbital fracture, 32 of inforbital fracture, 2 of medial orbital fracutre, 2 of lateral orbital fracutre. 7 cases of simple fracture showed abnormal results. (Fig-1) There were 44 combined fracture; 9 cases involving superior orbital wall, 43 cases involving inferior orbital wall, 12 cases involving medial orbital wall, 35 cases involving lateral orbital wall. (Fig-2) All 26 trigeminal neuropathy patients were diagnosed through infraorbital stimulation, 7 of them were also identified as abnormal values in supraorbital stimulation. Sensitivity was hightest for R1 by infraorbital stimulation, followed by [R1 Fx - R1 Non] and [R2 Fx - cR2 Non]. The specificities were 100% except for infraorbital stimulation [R1 Fx - R1 Non] and supraorbital stimulation [R1 Fx - R1 Non].

**Conclusion**

The most common site of post-traumatic orbital wall fractures was infraorbital wall. As a result, infraorbital nerve injury was more frequent than the supraorbital nerve injury. In this study, there were no the supraorbital neuropathy alone but only the cases which the supraorbital neuropathy were combined with infraorbital neuropathy. In order to confirm for the trigeminal neuropahty with orbital wall fracture, it is recommended that stimulate not only supraorbital but also infraorbital.

| | No of Cases | Trigeminal Neuropathy |
|---|---|---|
| Superior wall | 2 | 0 |
| Inferior wall | 32 | 7 |
| Medial wall | 2 | 0 |
| Lateral wall | 2 | 0 |
| Total | 38 | 7 |

**Fig-1**

| | No of Cases | Trigeminal Neuropathy |
|---|---|---|
| Including Superior wall | 9 | 4 |
| Including Inferior wall | 43 | 19 |
| Including Medial wall | 12 | 5 |
| Including Lateral wall | 35 | 17 |

**Fig-2**

| | Sensitivity (%) | Specificity (%) |
|---|---|---|
| Infraorbital stim R1 (>13.1) | 100.0 (86.8-100.0) | 100.0 (93.6-100.0) |
| Infraorbital stim R2 (>41) | 76.9 (56.4-91.0) | 100.0 (93.6-100.0) |
| Infraorbital stim cR2 (>43) | 69.2 (48.2-85.7) | 100.0 (93.6-100.0) |
| Suprorbital stim R1 (>13.1) | 26.9 (11.6-47.8) | 100.0 (93.6-100.0) |
| Suprorbital stim R2 (>41) | 15.4 (4.4-37.9) | 100.0 (93.6-100.0) |
| Suprorbital stim cR2 (>43) | 15.4 (4.4-34.9) | 100.0 (93.6-100.0) |
| Infraorbital stim [$R1_{Fx}$ - $R1_{Non}$] (>1.2) | 96.2 (80.4-99.9) | 94.6 (85.1-98.9) |
| Infraorbital stim [$R2_{Fx}$ - $R2_{Non}$] (>5.0) | 96.2 (80.4-99.9) | 100.0 (93.6-100.0) |
| Infraorbital stim [$R2_{Fx}$ - $cR2_{Non}$] (>8.0) | 69.2 (48.2-85.7) | 100.0 (93.6-100.0) |
| Supraorbital stim [$R1_{Fx}$ - $R1_{Non}$] (>1.2) | 30.8 (14.3-51.8) | 98.2 (90.4-100.0) |
| Supraorbital stim [$R2_{Fx}$ - $R2_{Non}$] (>5.0) | 26.9 (11.6-47.8) | 100.0 (93.6-100.0) |
| Supraorbital stim [$R2_{Fx}$ - $cR2_{Non}$] (>8.0) | 23.1 (9.0-43.6) | 100.0 (93.6-100.0) |

**Fig-3**

**Fx : Fracture side, Non : Non-fracture side, c : contralateral**

**The reference values in parentheses() are reference in Kimura J, Powers JM, Van Allen MW: Reflex response of orbicularis oculi muscle to supraorbital nerve stimulation: Study in normal subjects and in peripheral facial paresis. Arch Neurol 1969;21:193-199**