Comprehensive AOCMF Classification System

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Miface fractures – Level-3 system (cases 59 to 66)
Case 59: Undisplaced midface fracture: bilateral Le Fort I, unilateral Le II Fort II right, and zygoma left - as component of a panfacial fracture
Imaging: 3D CT scans – frontal view a), Panoramic X-ray – OPT b), basal axial view – mandible removed c), posterior view to pterygoids and condylar process regions – posterior skull removed d), 3D CT scan – lateral-inferior- medial circumference in craniofrontal view – orbital roofs and forehead removed e), coronal CT scans f) - i), sagittal CT scans – series from patients right to left side – at lateral lamina of pterygoid process right j), at medial lamina of pterygoid process right k), at medial lamina of pterygoid process left l), at lateral lamina of pterygoid process left m)

Description: Undisplaced bilateral Le Fort I analogous fracture, incomplete bilateral Le Fort II analogous fracture (incomplete – no nasal involvement) in combination with left zygoma fracture

Details Midface: Dentition (FDI); full dentition pre-injury, no traumatic affection

Pterygoids: bilateral incomplete horizontal fractures midway in the processes, no pterygomaxillary disjunction, i.e. vertical separation

Fragmentation: multiple fragments of facial antral wall left, multifragmentation of maxillary tuber region left (LCM) not reaching into the inferior orbital fissure, otherwise none – single suture lines

Displacement: none

Internal orbits: involvement confined to anterior orbital section right, involvement of the anterior and midorbital section left, right - inferior wall, left – lateral inferior wall and lateral wall

Details Mandible: Condylar base fracture right, fracture line runs below the sigmoid notch, non-fragmented, no sideward displacement, minimal medial angulation, no dislocation of condylar head out of the fossa. No loss of ramus height. Predominantly horizontally running ramus fracture right angulated and ascending at posterior border of the ramus, non-fragmented, undisplaced sagittal fracture in left mandibular body posterior to canine 33, i.e. premolar region, non-fragmented, undisplaced.
Level 3 Code: 91 P.A0.m.B0
P (right) B0
92 l0i.L0.Pt0.Oi.m.Oil.Pt0.L0.l0i.Z0i
Orbit (right): R(i).W1(i)
Orbit (left): R(li).W1(li)

AOCOIAC case CMTR-92-107
Case 60: Zygoma minimally displaced with multifragmentation of ZMC and ZSS

Imaging: 3D CT scans – oblique lateral view left a), caudofrontolateral view left b), posterolateral view left c), detail: axial CT scans d) – f), coronal CT scans g), sagittal CT scans — at medial lamina of pterygoid process left h), at lateral orbit/ inferior orbital fissure left i).

Conventional Description: Minimally displaced single-piece (monofragment) zygoma fracture left, fragmentation zones at facial antral wall, zygomatico-maxillary crest and zygomatico-sphenoid suture line

Details: Dentition (FDI): unaffected

Pterygoid: not involved

Fragmentation: multifragmentation of the facial antral wall / zygomatico-maxillary crest and the zygomatico-sphenoid junction, single fracture line separating the zygomatic arch from the zygomatic body near natural suture line

Displacement: rotation along a vertical axis (y-axis) going through the zygomatico-frontal
suture line (inward movement anteriorly, outward movement posteriorly), impaction of the fragmented anterior wall and the zygomatico-maxillary crest.

Internal orbits: involvement confined to anterior and midorbital sections: left - inferior wall unaffected – exclusively lateral wall involved.

Level 3 Code: 92 m.Oil.Ii.Z1i
93 m.M0
Orbit (left): R(ii).W1(ii)2(I)

AOCOIAC case CMTR-92-108
Case 61: Le Fort I Type 1, 2 and 3 fracture combination, bilateral NOE and frontal sinus fractures
Imaging: 3D CT scans – frontal view a), caudofrontal view b), lateral view right c), lateral view left d), craniofrontal view e), coronal CT scans, anterior – to posterior series f–j), axial CT scans k–r), sagittal CT scans, series from right to left side of patient – at lateral lamina of pterygoid process right s), at medial lamina of pterygoid process right t), paramedian right u), at medial lamina of pterygoid process left v), at lateral lamina of pterygoid process left w), at lateral orbital rim left x).

Conventional description: Midface fracture: Classic Le Fort I fracture, Le Fort II, III analogous fracture combination, bilateral NOE; Craniofacial fracture: frontal sinus, anterior (multifragmented) and posterior wall.

Details: Dentition (FDI): Full maxillary dentition pre- and postinjury

Pterygoids: bilateral complete horizontal fractures just below sphenoid body, no pterygomaxillary disjunction, i.e. vertical separation

Fragmentation: bilateral multifragmentation of facial antral walls, horizontal fracture of zygomatic body right, multifragmentation of zygomatic arch right, shearing fracture of temporal origin of zygomatic arch left, plural fragments of infraorbital rim left, multifragmentation of glabella region /anterior frontal sinus wall, large nasomaxillary fragments bilaterally, multifragmentation along zygomatico-sphenoid suture line right and left, multiple fragments of vomerine bone (caudal septum).

Displacement of major fragments: retrodisplacement of Le Fort I and II fragments, retrodisplacement (flattening) of both zygomas. Impaction of antral walls.

Internal orbits: bilateral fracture involvement of the anterior orbital sections and the midorbit, defect fractures right.
Level 3 Code: 92 Z0i.I0i.L.Pt0.Olim.U1m.Omil.Pt0.L.I0i.Z0i (LF-L.m.LF-l)
93 A. Os.m. Os.M
94 F1m.m. F1m

Orbit (right): R(slim). W1(slim)2(lim)
Orbit (left): R(sim). W1(lim)2(lim)

AOCOIAAC case CMTR-92-109
Case 62: Panfacial fracture - retrosdiplaced Le Fort I, II, III midface fracture, parasagittal palatal fracture and triple mandibular fracture: symphyseal fracture and bilateral condylar base fracture
Imaging: 3D CT scans – frontal view a), craniofrontal view b), lateral view right c), lateral view left d), caudo frontal view e), axial CT scans f) – l), 3D CT scans – axial basal view – mandible removed m), mandible from below n), coronal CT scans o) - w), 3 D CT scan – pterygoid processes, upper jaw and choanae from posteriorly x), sagittal CT scans – series from patients right to left side – paramedian/transition zone right y), at lateral lamina of pterygoid process right z), at medial lamina of pterygoid process right za), at lateral ethmoid right zb), midsagittal zc), at medial lamina of pterygoid process left zd), at lateral lamina of pterygoid process left ze), at middle orbit left zf).

Details Midface:

- **Dentition (FDI):** full dentition preinjury, loss of 11 and crown fracture of 21, enlarged peridontal spaces 12, 13 and 22, 23 (suspected partial avulsion – tooth loosening)
- **Pterygoids:** bilateral horizontal fractures midway in the processes with multifragmentation of the pterygoid laminae, no pterygo-maxillary disjunction, i.e. vertical separation
- **Palate:** parsagittal (longitudinal) fracture left, palatal alveolar process fracture line right running backwards from the right canine
- **Fragmentation:** multiple fragments of both facial antral walls and zygomatico-maxillary crests, multifragmentation of infraorbital rim right, multiple fragments along zygomatico-sphenoid suture line right, single fracture line separation of frontonasomaxillary process and nasal bone left, multifragmentation of the anterior upper alveolar process with bone loss of the outer cortex (tooth sockets 13 – 23), multifragmentation of maxillary tuber region left (LCM) reaching into the inferior orbital fissure and the orbital floor, otherwise none – single suture lines, multiple (double) fractures of both zygomatic arches, multifragmentation of the vomer and the perpendicular plate, multifragmentation of both lateral nasal cavity walls.
- **Displacement:** extreme outward displacement of both zygomas with large openings of the zygomatico-sphenoid sutures, retrodisplacement of Le Fort I and II fragments,
- **Internal orbits:** involvement goes deep into the orbit bilaterally but not into the cone, posterior ledges available on both sides, fractured walls - right – lateral + inferior + medial + superior (i.e. inferior frontal sinus boundary); fractured walls left – lateral + inferior + medial

Details Mandible:

- **Condylar base fracture right,** fracture line below the sigmoid notch, non-fragmented, medial override, contact at fracture site lost, minimal medial angulation of condyle bearing small fragment, no dislocation of condylar head out of the fossa, orthotopic distortion, displacement of large mandibular fragment (ramus stump and body) laterally, reduction of ramus height;
- **Condylar base fracture left,** fracture line runs below the sigmoid notch, non-fragmented, medial override, contact at fracture site lost, approximately 30° medial angulation, no dislocation of condylar head out of the fossa but dystopic distorsion, displacement of large mandibular fragment (ramus stump and body) laterally. Reduced ramus height;
- **Symphyseal fracture with basal wedge and small intermediate fragment,** step-like vertical displacement, lingual gapping
Level 3 Code:

91 P.S1.P - P (right): B0 - P (left): B0
92 Z1I1.L1da.Pt0.Olim.U0m.P2.Omil.Pt0.Lt1.I0i.Z0i
93 A0. Os.m. Os.A
94 F1m.m. F1m

Orbit (right): R(lim). W1(slim)2(im)
Orbit (left): R(lim). W1(slim)2(im)

AOCOIAC case CMTR-92-110
Case 63: Complex zygomatic fracture
Imaging: 3D CT scans – oblique left frontolateral view a), caudolateral view left b), craniofrontal view c), caudofrontal view d), detail: medio lateral view into left orbit e), detail: postero lateral view into temporal fossa zygapaticosphenoid junction zone f) coronal CT scans – antero-posterior series g) – j), axial CT scans k) – m), sagittal CT scans – at orbital transition zone / internal orbital buttress left n)-o), lateral orbit / inferior orbital tissue p), at lateral – lateral antral recess q), at lateral orbital rim left r)

Conventional description: Postero-medially displaced multi-piece zygoama fracture left associated with inferior orbital wall fracture and multifragmentation along the zygomatico-maxillary crest and facial antral wall.

Details: Dentition (FDI): unaffected, full upper jaw dentition pre- and post-injury
Pterygoid left: unaffected

Fragmentation: atypical fracture of zygomatic body with a semicircular fracture line running parallel to the infero-lateral orbital rim, single fracture lines along the upper zygomatico-sphenoid and zygomatico-frontal suture line, multifragmentation in the lateral portion of the inferior orbital wall involving the inferior orbital fissure and the lower end of the zygomatico-sphenoid suture line, multifragmentation of the antral wall, single fracture of infraorbital rim, single fracture separating zygomatic arch from zygomatic body near the zygomatico-temporal articulation, second single suture line midway in zygomatic arch.

Displacement: medial and posterior displacement of the zygoma decreasing orbital volume, dorsal impaction of zygomatic body fragments

Internal orbits: involvement of the anterior and midorbital section: left - inferior + lateral wall, posterior ledge intact, internal orbital buttress intact.
Level 3 Code: 92 m.Oil.I1i.Z1i
Orbit (left): R(li).W1(li)2(i)
AOCOIAC case CMTR-92-111
Case 64: Pancraniofacial fracture
Imaging: 3D CT scans – frontal view a), craniofrontal view b), oblique lateral view right c), oblique lateral view left d), dorsal aspect of the mandible – posterior skull removed e), axial basal view – mandible removed f), oblique cranial view of left zygoma g), axial CT scans h) – za), 3D CT scan – anterior and middle cranial fossa, inner side of frontal bone – from coronal
CT scans zb) - zl), sagittal CT scans – series from patients right to left side – at lateral orbital rim right zm), at lateral lamina of pterygoid process right zn), at medial lamina of pterygoid process right zo), transition zone/lateral ethmoid right zp), at medial lamina of pterygoid process left zq), at lateral lamina of pterygoid process left zr), at medial orbit left zs), at zygomatic body zt), 3 D CT scan – pterygoid processes, upper jaw and choanae from posteriorly zu).

Conventional description: Pancraniofacial fracture

- Cranium: multifragmented frontocranial fracture
- Midface fracture: Le Fort I (high), II, III in combination, retrodisplacement, flattening
- Double mandibular fracture: parasympysis and condylar head fracture with severe displacement resulting in significant mandibular widening

Details Cranium:

- Multiple undisplaced, large scale fragments of frontal bone with interjacent fracture lines radiating forehead up to the coronol suture and into the parietal bones from semicircular fracture edging the upper, single fracture line extending parasagittally right, multifragmentation with displacement of the anterior and posterior frontal sinus walls

Details Midface:

- Dentition (FDI): Lacking Tooth in position 15
- Maxillary alveolar process atrophy in position 15: No to mild moderate
- No traumatic tooth loss
- Pterygoids: bilateral multifragmentary separation from the skull base and the posterior maxillae resulting in a sort of vertical pterygomaxillary disjunction
- Palate: paramedian sagittal fracture right starting between upper medial and lateral incisor right
- Fragmentation: single fracture lines at most articulations of both zygomas apart from multiple fragments at the sphenozygomatic junction right, of zygomatico-maxillary crest right and facial antral wall right (high Le Fort I line), single fracture of infraorbital rim right, single zygomatico-maxillary fracture line left extending medially into the piriform aperture and not running into the infraorbital rim, multifragmentation of nasal bones, large frontonaso-maxillary fragments, single fracture line separation of the nasal skeleton at the nasofrontal suture line, multifragmentation in both transitions between supero medial orbital quadrants and anterior frontal sinus wall, vertical alveolar process fracture line between 11 and 12 relating to palatal fracture, multifragmentation of both maxillary tuber regions left reaching into the inferior orbital
fissure and the orbital floor, multiple (double) fractures of both zygomatic arches, shearing fracture at temporal origin of left zygomatic arch, multifragmentation of the vomer and the perpendicular plate, multifragmentation of both lateral nasal cavity walls.

- Displacement: extreme outward displacement of both zygomas with large openings of the zygomatico-sphenoid sutures, retrodisplacement of Le Fort I and II fragments, spatial displacement of multifragments of the pterygoid process laminae, minimal step like displacement of palatal fracture.

- Internal orbits:
  - Involvement deep over the midorbit (both sides) into posterior orbit (left side), right – lateral, inferior, medial and superior (i.e. inferior frontal sinus boundary) walls, left – lateral, inferior and superior walls.

Details Mandible:

- Condylar head fracture left, sagittal fracture line encompassing the lateral pole zone, non-fragmented, antero inferior displacement of the medial fragment
- Dislocation of small medial fragment out of the fossa, displacement of large mandibular fragment (ramus and body) laterally abutting the lateral border of the glenoid fossa / Zygomatic arch, reduction of ramus height.
- Zig-zag shaped symphyseal fracture line with diastasis of fragments, small intermediate fragment at the base, widening of the mandibular arch due to lateral displacement of body/ramus fragment on the left.
Level 3 Code: 91 S0.P - P (left) Hp0
92 Z0.i.I0.i.L0.Pt1.Olim.U1m.P2.Omil.Pt1.L0.I0.i.Z0i
93 A0.Os.m.Os.A0.S0
94 F1m.P0.m.P0.F1m
Orbit (right): R(slim).W1(slim)2(im)
Orbit (left): R(slim).W1(slim)2(im)

AOCOIAC case CMTR-92-112
Case 65: Central craniocfacial - asymmetric bilateral NOE fracture in Combination with frontal sinus fracture
Imaging: 3D CT scans – frontal view a) basal axial view - mandible removed b), cranial view into anterior skull base from dorsal aspect c), coronal CT scans d)-g), axial CT scans h)-l), sagittal CT scans – paramedian right m), midsagittal n), parasagittal / ethmoid left o), paramedian orbit left p), middle orbit left q).

Conventional description: Retrusion after central midface fracture with extension into the anterior and posterior frontal sinus walls

Details: Dorsally impacted midface and shortening of the nose, resulting from telescoping of the nasal skeleton backwards into the anterior ethmoid, multifragmentation at the nasal root in transition to the anterior wall of the frontal sinus including both superomedial orbital quadrants, minor involvement of posterior frontal sinus wall on the right, bilateral fractures of the inferior and medial orbital walls.

Dentition (FDI): Full dentition pre- and postinjury, no occlusal involvement

Pterygoids: no involvement

Fragmentation: Multifragmentation of the facial antral wall, infraorbital rim right, frontonasomaxillary process on the right, frontonasomaxillary process on the left non-fragmented, multifragmentation of right inferior and medial orbital walls (posterior bony ledge – orbital flange of palatine bone intact), multifragmentation of the anterior wall of frontal sinus, multifragmentation of posterior sinus wall in the midsagittal area.
Displacement: retrodisplacement of the nasomaxillary complex into the ethmoid and anterior/midorbit section (right > left).

Internal orbits: involvement of the anterior and midorbital sections on both sides: right—inferior, medial and superior walls, left—medial, inferior and superior walls.
Level 3 Code:  92 l1i.Oim.U1m.Omi.l0i
93 Os.Ca0.Os.A
94 F1m.m.F1m
Orbit (right): R(sim).W1(im)2(im)
Orbit (left): R(sim).W1(sim)2(im)

AOCOIAC case CMTR-92-113
Case 66: Midface fracture: atypical Le Fort I and II combined with palate, atypical zygoma left and involvement of greater sphenoid wing left
Imaging: 3D CT scans – frontal view a), lateral view left b), basal axial view mandible removed c), axial CT scans d) - h), coronal CT scans i) - o), 3D CT scan- at lateral lamina of pterygoid process right p), at medial lamina of pterygoid process right q), at medial lamina of pterygoid process left r), at lateral lamina of pterygoid process left s), medial orbit left t), at middle orbit left u), at lateral orbital rim left v), at zygomatic body left w)

Conventional description: Midface fracture: Le Fort I, II, paragittal and transverse palate, atypical (multifragmented) zygoma left; Craniofacial fracture (latero-orbito-cranial left): orbital roof left, greater sphenoid wing (GWS) left.

Details:

- Dentition (FDI): preinjury loss of: 11, 14, 16, 24, 25
- Maxillary alveolar process atrophy: right moderate; left moderate
- Pterygoids: no fractures, no pterygo-maxillary disjunction
- Palate: longitudinal fracture parasagittal right (from premolar region 14/15 running posteriorly), transverse fracture from premolar region right to molar region left
- Fragmentation: Combined parasagittal and transverse palatal fracture, posterior portions of upper jaw not involved in the overall fracture, Le Fort I and II fracture lines, with large single piece frontonasal-maxillary fragment right and multifragmented frontonasal-maxillary process left, atypical zygoma fracture: horizontal fracture of zygomatic body, multifragmented facial antral wall and infraorbital rim left, multifragmentation of the zygomatico-sphenoid junction and GWS left, double fracture of zygomatic arch (anteriorly and posteriorly)
- Displacement: Posterior and upward intrusion combined with forward rotation of anterior upper jaw fragment after transverse separation along the palate at the level of the edentulous premolar regions, posteromedial and downward displacement of upper rim containing fragment of left zygoma
- Internal orbits: involvement of anterior orbital section on the right, involvement of anterior, midorbital and posterior section on the left; right – inferior wall; left – medial, inferior, lateral and superior wall (4-wall fracture with affection of superior orbital fissure)
Level 3 Code: 92 l0i.L0.0i.U1m.P3.Om1i.L0.l1i.Z1li
93 m.Os.M.A
 Orbit (right): R(im).W1(i)
 Orbit (left): R(lim).W1(sim)2(slim)

AOCOIAC case CMTR-92-114