J. Maxillofac. Oral Surg. (Oct–Dec 2014) 13(4):425–430
DOI 10.1007/s12663-013-0527-2

RESEARCH PAPER

Why and How Maxillofacial Disability and Impairment Due to Trauma Should be Quantified for Compensation: A Need for Nationwide Guidelines

Navin Shah · Soniya Palan · Amit Mahajan · Parshwa Shah · Rakesh Shah · Prachur Kumar

Received: 24 December 2012 / Accepted: 13 April 2013 / Published online: 19 May 2013

Abstract
Introduction India being is a country with different social, cultural, geographical and economic backgrounds; it is also grounds of rapid industrialization, mechanization of farming and increase in vehicular traffic which increases the no. of accidents and issues related to disablement and compensation of maxillofacial injuries.
Need for the study There is no system available for evaluation for such injuries. The pathological condition states the nature of an illness but not the extent of the remaining health. Since the individual reacts as an integer it is important to include some appraisal of the physical factors influencing his work efficiency. As there is little clarity for disability and impairment, its separate assessment for maxillofacial injury is necessary. There are complex maxillofacial injuries that may cause impairment of sense, esthetic compromises, and functional loss. Epidemiology of craniofacial trauma—approximately 50 % of 12 million annual traumatic wounds treated in emergency rooms involve the head and neck. Being most common along with other injuries but is never considered for compensation. Facial region being the one that is the identity and factor that influences its social and emotional behavioral changes has not been considered. In this article various aspects have been considered for evaluation of compensation and disablement due to maxillofacial injuries.

Keywords Compensation · Maxillofacial injuries · Disability · Impairment

N. Shah (✉) · S. Palan (✉) · A. Mahajan · P. Shah · R. Shah · P. Kumar
Department of Oral and Maxillofacial Surgery, K. M. Shah Dental College and Hospital, Sumandeep Vidhyapeeth University, Piparia, Vadodara 391760, Gujarat, India
e-mail: drnavin33@yahoo.com

S. Palan
e-mail: soniyapalan@gmail.com

S. Palan
67/A Samarpan Housing Complex, Vasna road, Behind Raneshwar temple, Vadodara 390012, India

Introduction

Considering the present scenario in India disability, evaluation is needed to award compensation, stipends, employment, conveyance allowance, travel concessions, tax-deduction benefits, admission to various courses, etc. to the disabled. From time to time statutory provisions have been made to award compensation due to disability but have not been fully justified on accounts of the disabled. Thus changing demographic picture with increase in life expectancy, labor force and active working population in industries, urban or rural areas, has brought in awakening for a number of disability problems in all age groups and more over in the productive group who require measures for disability evaluation and rehabilitation. Psychological testing is rarely included in the routine physical examination except for observation of the patient's behavior during the examination—his orientation or lack of it, cooperative or non-cooperative attitude, or any gross abnormality in behavior should also be taken into consideration. There are many other factors which have to be considered before evaluating the losses occurred and estimating the compensation factor.

Definition

According to Kessler: Disability has been defined as the inability to meet certain standards of physical, social,

occupational, and economic competence. In the need for medical criterion that would approach the criteria's of evaluation process, namely, practicality, uniformity and accuracy, two basic problems are faced, one qualitative and the other quantitative. Functional loss as a criterion most closely meets the requirements [1, 2].

According to WHO: Disability in which functional limitation and or impairment is a causative factor, is defined as an existing difficulty in performing one or more activities which, in accordance with the subject's age, sex and normative social role, are generally accepted as essential, basic components of daily living, such as self-care, social relations and economic activity. Depending in part on the duration of the functional limitation, disability may be short-term, long-term or permanent.

Impairment is a permanent or transitory psychological or anatomical loss and /or abnormality. Impairment may cause functional limitations which are the partial or total inability to perform those activities necessary for motor, sensory, or mental functions within the range and manner of which a human being is normally capable such as walking, lifting loads, seeing, speaking, bearing, reading, writing, counting, taking interest in and making contact with surroundings, A functional limitation may last for a short time, a long time, be permanent or reversible. It should be quantifiable whenever possible. Limitations may be described as "progressive" or "regressive".

Points of Considerations for Functional Efficiency

Function can be considered as a representing factor for the true measure of ability or disability. What is an affected or fractured jaws importance or post trauma losses? What can the man do after injury? In what way is its function affected or has been deficient? The evaluation of functional loss is the keynote to the vocational, social, esthetic and economic ability of the injured. Responsibility of evaluating disability has fallen on the physician and medical assessment, and also the only one that plays a major role in the final judicial decision concerning disability claims. Gross error tends to occur as the standards of evaluation are insufficiently grounded or is specific in relation to anatomical and physiological reality [3].

In addition to the medical losses, physical impairment produces distinct personal, social, and economic disturbances. Wages, earning capacity, working capacity, and special occupational skills are lost or diminished or compromised. Fitness to perform the routine activities of living deteriorates. Obviously these are not specific medical effects, but they compound the medical situation to produce disability. Although the physician is able to estimate the nature and degree of medical impairment, nothing in his training and little in his experience have prepared him for the task of evaluating the psychological, social, and economic consequences. He is trained to observe defects and to measure variations from normal, but no system of pathological evaluation includes estimation of loss of capacity to work and other associated nonmedical factors.

Unfortunately, there is no single method on which the determination can be made, nor is there any formula or method that can accurately express disability or impairment in quantitative terms. Yet these are the terms demanded by government, industry and judiciary. They ask, "What is the extent of disability? What is the percentage of impairment?" to define the nature and degree of the impairment precisely [2]. The doctor may be called upon to verify as an expert witness in the court of justice. The expert witness is legally bound to declare his knowledge of the case and express his opinion on amount of loss, disability and impairment [4].

The face contains specialized system needed to see, hear, smell, breathe, eat and speak. It also has vital structures within the head and neck which are intimately associated with the systems. Several facial injuries may be life threatening: hemorrhage, airway obstruction, aspiration. The psychological impact of facial disfigurement can be devastating. Sometimes these trauma evaluations can be difficult just after trauma as: Facial features are often obscured and distorted by endotracheal and gastric tubes and tapes that hide them in place. Response to painful stimuli is blunted. Thus, evaluation of localized pain secondary to fractures is difficult. Presence of edema makes fracture evaluation even more difficult and questionable. It is also very difficult to diagnose all the facial injuries immediately after trauma, so the actual diagnosis is after 7–10 days post trauma, wherein the patient is stabilized systemically and the pain and edema is also controlled to diagnose hidden trauma. Because of unavoidable causes there is delay in the management of maxillofacial and dentoalveolar injuries. This imposes residual disability and impairment of functions and esthetics. Evaluation of the extent, degree and severity of the maxillofacial disability and impairment needs to be quantified on the basis of scientific background.

Concepts in facial aesthetics analysis include balance, proportion, symmetry, and harmony. It is the combination of facial features in balance and proportion rather than any one specific characteristic that we equate with facial beauty. It should be remembered during facial evaluation that exceptions to the rules of facial proportion are sometimes encountered in beautiful faces that demonstrate unique and pleasing disproportion [5, 6].

In multiple impairments, two complementary systems are used: adding percentages and combining percentages.

Methodology for calculation of disability: [2, 3]

The formula for combining values is:

$$\frac{a + b(100 - a)}{100} = x$$

where 'a' is the higher and 'b' the lower of the two values to be combined, where two values are considered.

Combining values for the physical impairment—of all 3 losses—formulae would be:

- motion(a)
- strength(b)
- coordination(c)

Using formulae 2 values are taken at a time.

$$a + b(100 - a)/100 = d$$
$$d + c(100 - d)/100 = e$$

Summary of loss of impairment being value e [2, 7, 8].

e.g. If there is a road traffic accident case with rod hit directly on mid face—diagnosed *as Lefort I fracture,* calculating its impairment according to above mentioned formulae would be

Loss of motion Due to downward and backward displacement of maxilla, masticatory movements are restricted, mandibular movements normal, but due to displaced maxilla overall reduction in movements of jaws can be estimated up to *75 %.*

Loss of muscle strength Mandibular muscular strength hampered due to trauma but in functional point of view, loss would be around *25 %*

Loss of coordination There loss of neurovascular coordination in maxilla, counting the loss upto *50 %*

Calculating the total loss

$$a + b(100 - a)/100 = d$$
$$75 + 625/100$$
$$700/100 = 7$$
$$d + c(100 - d)/100 = e$$
$$7 + 50(100 - 7)/100$$
$$7 + 50 * 93/100$$
$$4,657/100 = 46.57\,\%$$

e.g. If there an injury of maxillofacial region with a blow on face, diagnosed with *right angle and left condylar fractures*, the impairment loss would be

Loss of motion There is disturbed occlusion and loss of movement due to fractured segments, accounting to unilateral movements but that too uncoordinated, accounting to loss of about 75 %

Loss of muscle strength Muscular strength on right side is hampered and on left condyle too, accounting to loss of 75 %

Loss of coordination The loss of coordination on either side due to trauma and fracture of segments on either side involving the major neurosensory bundles, accounting to loss of upto 80 %

$$a + b(100 - a)/100 = d$$
$$d + c(100 - d)/100 = e$$
$$75 + 75 * 25/100$$
$$75 + 1,875/100 = 1,950/100 = 19.5$$
$$19.5 + 80 * 80.5/100 = 19.5 + 6,440/100$$
$$= 6,459.5/100 = 64.595\,\%$$

Therefore total loss of functional efficiency in such a case would be 64.59 %.

Personal Injury Compensation for Oral and Maxillofacial region.[9]

General damages for facial and sensory injuries

	Min	Max
Facial injuries		
Skeletal injuries		
Le Fort fractures of frontal facial bones	£13,500	£20,000
Multiple fractures of facial bones	£8,000	£13,250
Fractures of nose or nasal complex	£1,000	£12,750
Fractures of cheekbones	£1,350	£8,750
Fracture of jaws	£3,500	£25,000
Damage to teeth	£600	£6,250
Facial disfigurement		
Females—scarring	£1,000	£53,000
Males—scarring	£1,000	£36,000
Injuries affecting sight		
Total blindness and deafness (in the region of)	£220,000	
Total blindness (in the region of)	£147,500	
Loss of sight in one eye with reduced vision in the remaining eye	£35,000	£98,000
Total loss of one eye	£30,000	£36,000
Complete loss of sight in one eye	£30,000	£27,000

General damages for facial and sensory injuries		
	Min	Max
Serious but incomplete loss of vision in one eye	£13,000	£21,000
Minor but permanent impairment of vision in one eye	£6,750	£11,500
Minor eye injuries	£2,150	£4,750
Transient eye injuries	£1,250	£2,150
Deafness		
Total deafness and loss of speech	£60,000	£77,000
Total deafness	£50,000	£60,000
Total loss of hearing in one ear	£17,500	£25,000
Partial hearing loss/tinnitus		
Severe	£16,000	£25,000
Moderate	£8,000	£16,000
Mild with some hearing loss	£6,750	£8,000
Slight occasional tinnitus with slight hearing loss	£4,000	£6,750
Damage to hair	£2,150	£6,000

Esthetic loss The second major criteria to estimate the loss of disfigurement in maxillofacial injury is the esthetic loss, according to Manual for doctors to evaluate permanent physical impairment [7, 8, 10].

Esthetic loss can be divided upon the area affected, which has been categorized and summarized in points of figure 100, in detailed calculations can be carried out according to the explanations given in the chapter earlier. But an outline to state the losses to come to a conclusion in esthetic loss would be:

.

Split up of ten point formula for each component		
1. Scalp and vault including forehead		
Scalp (disfigurement alone)		2.5
Scalp and bone		10
2. Eye brows		
Part of one or both	Rt/Lt	2.5
Total loss of one or both	Rt/Lt	10
3. Eye lids upper		
Skin disfigurement alone	Rt/Lt	1.5
Deformity or full thickness loss	Rt/Lt	6
4. Eye lids lower		
Skin-disfigurement alone	Rt/Lt	1
Deformity or full thickness loss	Rt/Lt	4
5. Pinna		
Anterior or posterior skin disfigurement alone	Rt/Lt	2.5
Deformity due to full thickness involvement of skin and cartilage without obliteration of meatus	Rt/Lt	7.5
Deformity due to full thickness involvement of skin and cartilage with obliteration of meatus	Rt/Lt	10
6. Nose		
Skin cover disfigurement alone		2.5
Deformity due to full thickness involvement with both nares patent		7.5
Full thickness deformity with one nare obliterated (7.5, 1.25)		8.75
Full thickness deformity with both nares obliterated		10
7. Middle and lower third of face		
Only aesthetic loss due to soft tissue/skeletal damage		7.5
Functional loss (mal-occlusion and mastication)		22.5
Both aesthetic and functional losses		30

10 % additional weightage on over all criteria is to be given to the following factors [7].

1. Infection
2. Malalignment
3. Contractures
4. Cosmetic appearance
5. Malunion of fractured segments
6. nonunion of fractured segments
7. Delayed union of fractured segments
8. Complication
9. Residual defects after treatment

Thus, calculating the *total impairment* after adding the values of the two major components i.e. physical impairment and esthetic loss, we would get the total loss.

But the total loss could be divided in two major groups

Younger age group Wherein functional loss and esthetic loss could be given equal weightage of 50 % loss each.

Older age group In older age group functional loss is given more importance than the esthetic loss. Functional loss being 70 % and esthetic loss being 30 %.

Depending on the type of losses and after the estimation of their functional impairment and esthetic loss, their compensation should be estimated. This would give us the loss of *the facial component*.

Estimation for the compensation should be in relation to the whole body—The AMA Guides to the Evaluation of Permanent Impairment, the *AAOMS* supports the following classification and rating impairment of whole person [10].

Class 0 Impairment of the Whole Person, 0 %
A patient belongs to class 0 when there is limited scarring.
Class 1 Impairment of the Whole Person, 1–5 %
A patient belongs to class 1 when the facial abnormality is limited to a disorder of the cutaneous structures, such as visible scars and abnormal pigmentation, or mild unilateral total facial paralysis, or nasal distortion that affects appearance.
Class 2 Impairment of the Whole Person, 6–10 %
A patient belongs to class 2 when there is a loss of supporting structure of part of the face, with or without cutaneous disorder. Depressed cheek, nasal, or frontal bones.
Class 3 Impairment of the Whole Person, 11–23 %
A patient belongs to class 3 when there is an absence of a normal anatomical area of the face. Loss of an eye or loss of part of the nose with the resulting cosmetic deformity (if visual or respiratory loss, suggest other examiners), or severe unilateral total facial paralysis, or mild bilateral facial paralysis.
Class 4 Impairment of the Whole Person, 25–45 %
A patient belongs to class 4 when facial disfigurement is so severe that it precludes social acceptance. Massive distortion of normal facial anatomy, or severe bilateral total facial paralysis, or loss of major portion of nose.
50–60 % loss of facial component can estimate loss upto 10–15 % in relation to whole body
60–70 % estimates to 15–20 %
70–80 % estimates 20–25 %
80–90 % estimates 25–30 %
90–100 % estimates 30–40 % loss in relation to whole body.

Hence it can be hypothesized—that *for every percentage loss estimated in relation to the whole body 5000 to 10,000 rupees* could be compensated

Also it should be on the bases of the age, productivity and potentiality of that individual which would pronounce their compensation.

Recurrent expenses are also very common for a maxillofacial unit—so compensation for such expenses should be included in the total compensation. So it can be estimated that 10 % of the predecided compensation, should be re-compensated every 5–10 years as recurrent expenses and compensation should be announced as in total of the initially calculated compensation and to be compensated for recurrent expenses.

As very few guidelines are available we feel the need for a debate over this topic by more national experts to bring out a reasonable, scientific methodology for estimation of disabilities and impairment of maxillofacial region due to injuries and adequate compensation guidelines for the same.

Conclusion

To estimate or evaluate the total impairment in oral and maxillofacial injury cases, the criteria for loss is dependent upon

- Functional impairment (masticatory, vision and eye ball movement, smell, speech, hearing, taste and tactile sensations)
- Esthetic loss (because of hard tissue{fractures of facial bones, loss of teeth}, soft tissue{avulsed flaps, scars, laceration, etc})
- Rehabilitation of functional loss incorporates multiple surgeries, remedial cosmetic corrections, nerve repair procedures, and prosthetic appliances. Functional impairment because of maxillofacial injuries is a complex phenomenon which may be permanent or temporary and total or partial in nature.

Functional and esthetic loss because of maxillofacial injuries affects the productivity, confidence, and overall health of the person. It increases the financial burden to compensate for functional and esthetic loss due to maxillofacial injuries.

These losses could be *recurrent expenses*; losses which have to be kept in mind which over a result in replacement of the missing or repair of the fractured tooth with crown and bridges or implants, which over a period of years may need replacement. Rehabilitation by prosthetic replacement may not provide total compensation for functional loss.

Acknowledgments The authors sincerely thank the HOD, and other staff members of the department, Dr Kiran Desai, Dr Kruti Shah, Dr Rushit Patel, Dr Dixit Shah and Dr Rohit Tatu for providing valuable inputs for this thought provoking article.

Conflict of interest None.

Ethical issues None (no human or animal study has been carried out for this research).

References

1. Soniya Palan—under guidance of DR NAVIN SHAH (2012) Medicolegal estimation of disabilities due to maxillofacial injuries and its compensation—Dissertation, K. M. Shah Dental College and Hospital, Piparia
2. Henry H. Kessler (1970) Disability—Determination and evaluation, Philadelphia, Lea and Febiger
3. Guide to the Evaluation of Permanent Impairment. 6th edn (2007) American Medical Association

4. Tapas Kumar Koley (2004) Medical negligence and medicolegal aspect of patient care, Mehta Publishers, New Delhi
5. Naini FB, Gill DS (2008) Facial aesthetics: 2. Clinical assessment. The clinical ability to alter dentofacial form requires an understanding of facial aesthetics. Dent 35:159–170
6. Bentsiano B, Blitzer A (2004) Facial anatomy. Bentsianov and Blitzer Clinics in dermatology 22:3–13
7. Manual for doctors to evaluate permanent physical impairment. Based on Expert Group Meeting on Disability Evaluation & National Seminar on disability Evaluation and Dissemination D.G.H.S.—W.H.O.—A.I.I.M.S New Delhi—1981, p 4–9, 19–23
8. Veena Murlidhar, Vijay Kanhere, Murlidhar. Society for participatory research in Asia, New Delhi. Evaluation of impairment, disabilities in case of occupational and other diseases and accidents, p Vi, 29–32
9. http://www.osbornes.net/services/personal-injury/personal-injury-claims-compensation/facial-and-sensory-injury-compensation
10. Guidelines to the evaluation of impairment of oral and maxillofacial region (2008) American Association of Oral and Maxillofacial Surgeons, p 3–10
11. Ira D. Facial plastic and reconstructive surgery, 2nd edn, p 96–107

Other References

12. Quantum (June 2004 Version 1) Personal injury assessment board, p 5–7
13. Road accidents in India (2009) Government of India, Ministry of Road Transport and Highways
14. Parameters and Pathways: Clinical Practice Guidelines for Oral & Maxillofacial Surgery (AAOMS Parameters of Care, 2007)
15. Fundamentals of Impairment and Disability Evaluations Handbook (1995) American College of Occupational and Environmental Medicine