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QUANTIFYING TREATMENT - OUTCOME IN MAXILLO-FACIAL INJURIES

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SUMMARY : ***Statements regarding outcome in Plastic Surgery are often subjective and lack reproducibility, mainly because of lack of quantification of aesthetic issues. A method is being presented using maxillo-facial injuries as a prototype, to resolve virtually any plastic surgical problem into 3 basic components - Function, Aesthetics and Psycho-social. Unfavourable results are graded according to a strictly defined protocol. Aesthetic evaluation is performed by the patient and relatives/friends in a manner designed to reduce subjectivity and physician-induced bias.***

The system provides a comprehensive patient-satisfaction index which has been found useful for everyday post-surgical assessment and computer-based data-recording. It allows us to quantify results, pin point shortcomings and foster a desirable doctor-patient relationship.

With the use of such a system it should be possible to document, compare and even predict treatment-outcomes with a degree of precision not previously achieved.

INTRODUCTION

While analyzing treatment-outcomes of plastic surgical procedures in general, the lack of objective criteria is often very obvious. Quantification of aesthetic appearance is one major problem. Another is to comprehensively consider all the other major variables which affect patient happiness, satisfaction and physiological functions.

In our effort to develop a treatment outcome score for unsatisfactorily treated maxillo-facial injuries (MFIs), we were guided by the need for a meaningful pre-operative interaction between patient and doctor so as to curb unrealistic expectations on the part of both. This is particularly true for secondary reconstructive or aesthetic procedures in which the patient's understanding of the complexity of the problem may be poor.

These important interrelationships are expressed in (Fig. 1).

Virtually every plastic surgical problem can be resolved into 3 basic components: these are the functional, aesthetic and psychosocial implications. In order to quantify these in MFIs, it becomes necessary to highlight avoidable complications or unfortunate psychosocial outcomes by assigning to them weighted scores in a manner designed to reduce subjectivity of assessment (Fig. 2)

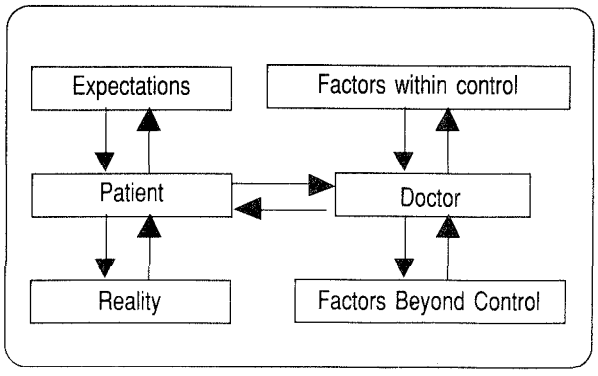


Fig - 1

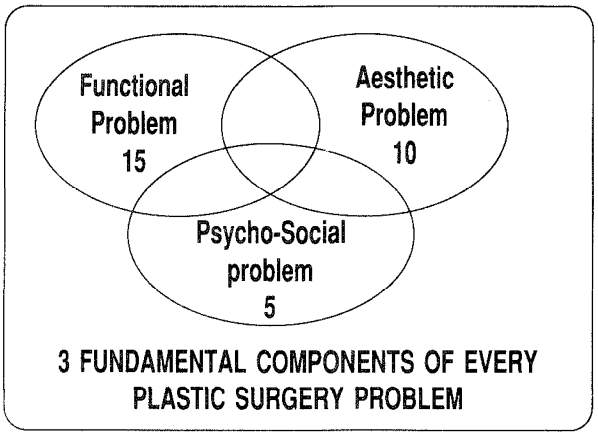


Fig - 2

AIM

The aim is to develop an objective treatment-outcome index for MFIs and related problems with the following inbuilt characteristics:

i) Understandable and useful to both patient and doctor

ii) Simple and rapid enough for every day outpatient and inpatient use

iii) Capable of computer-database recording

In this scheme, a higher score corresponds to a more unfavourable outcome and poorer patient-satisfaction level. The system is best suited to assessment after a few weeks or months of treatment, when complications become evident. It is unsuitable for evaluation in the acute trauma setting. 76 MFIs of all grades of complexity treated by this unit within the last 2 years have been interviewed and scored using the system about to be described in detail. Patients with significant injuries other than their MFIs have been excluded.

MATERIAL AND METHODS

Function Score

This lists 8 major avoidable complications of MFIs, imparting the greatest weightage to the most unwanted ones. For the assessment to be valid it must be performed by a qualified plastic/oral surgeon who has not been a party to the treatment. Strict defining criteria are employed and the responses are all or none depending on whether the doctor regards the implications as significant or insignificant. Allowing gradations (such as mild, moderate or severe) to the response introduces subjectivity which makes it difficult or impossible to compare data in a reproducible manner (Table 1).

Table 1

FUNCTION-SCORE : TOTAL 15

• BLINDNESS NOT EXISTING PRE-OPERATIVELY	4
• MALOCCLUSION SUFFICIENT TO PREVENT A NORMAL DIET	3
• RESTRICTED MOUTH OPENING INTER INCISAL DISTANCE < 15 mm	2
• NONUNION/MALUNION REQUIRING REPEAT SURGERY	2
• INFECTION	1
• AIRWAY OBSTRUCTION	1
• DIPLOPIA PERSISTING	1
• EPIPHORA TROUBLESOME	1

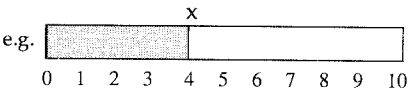
Aesthetic Score

Subjectivity and physician bias are circumvented by having this part of the evaluation to be completed jointly by patient and his/her inner social circle (spouse, close-relatives or friends). The evaluating doctor is allowed to explain the meaning of obscure medical terminology, but in no way actively participates in the rating process (Table 2).

Table 2

AESTHETICS-SCORE : TOTAL 10

A. PATIENT'S OWN RATING : WORST (MAXIMAL) = 5



A = (10-x)/2= 3

B. RELATIVES'/FRIENDS' ASSESSMENT:

• CONTOUR DEFECT	1/2
• DISH-FACE	1/2
• LONG-FACE	1/2
• SIGNIFICANT SCARS	1/2
• CROOKED NOSE	1/2
• TELECANTHUS	1/2
• DYSTOPIA	1/2
• ENOPHTHALMOS	1/2
• PTOSIS	1/2
• EYELID DISTORTION	1/2
Total	5

A. The patient is asked to rate his/her post-operative facial appearance (x) on a linear analog scale (LAS) if the pre-injury appearance were to be given 10 points. It is surprising how illiterate or uneducated patients from the poorest strata of society are still able to respond in an uninhibited manner when thus directly questioned. The actual score is given by the formula

$$A = (10-x)/2$$

because a higher value of X corresponds with greater patient satisfaction which is the reverse of what is required of A.

B. The patient's relatives/friends complete this assessment themselves. The weightage ascribed to known aesthetic complications has been kept arbitrarily equal for all responses, as all are considered equally blemishing from the patient's viewpoint. This part of the assessment enables both patient and doctor to understand the causes of a poor rating in the 1st part LAS. Being more objective it also tempers any

patient tendency to exaggerate, and provides an opportunity for the treating surgeon to explain what aspects of appearance can be improved upon. The responses are again all or none, depending upon whether the relatives/friends deem the complication as a significant contribution to the overall alteration of facial appearance.

Psycho-Social Evaluation

The ultimate aim of all our endeavours is to rehabilitate the patient back to the society as a productive individual in the shortest possible time. The psycho-social implications of unfavourable treatment have been quantified with the patient's and family's emotional, economic and civic burden in mind. This part of the evaluation could be completed jointly by patient and his/her doctor, though the presence of a psychiatrist or medical-social worker would be desirable in some cases. The scores include (Table 3):

Table 3

PSYCHO-SOCIAL SCORE: TOTAL 5

1. Social Embarrassment	: 1
2. Psychological Problem Mandating Treatment or Marital Discord Requiring Counselling	: 1
3. Dissatisfied with Hospital Functioning	: 1
4. Lost >60 work-days	: 1
5. Hospitalization > 5 days	: 1

i) Significant embarrassment or lack of confidence in public due to alteration of appearance.

ii) A psychological or marital problem as a direct consequence of the complications of treatment and of degree sufficient to require psychiatric treatment/counselling.

iii) Feelings of harassment or misguidance at any stage of treatment with particular reference to inefficient hospital functioning, even if the final result has been satisfactory.

iv) A loss of work-days exceeding the usual maximum period of inter-maxillary fixation (arbitrarily chosen as 60 days).

v) Hospital stay exceeding 5 days (which is felt to be adequate for treating most MFIs provided no other significant injuries are present).

Estimating Patient Satisfaction

The summarized format used by us is reproduced in Table 4. The essential steps performed are:

i) Specify and code the MFI

ii) Consider all possible complications (functional and aesthetic) relevant to the injury under consideration. This is facilitated by reference to the chart in Table 5. The total points indicate the worst possible score for that injury = WORST POSSIBLE SCORE (WPS)

Table 4

MAXILLO FACIAL FORMAT

CODE

Z = ZYGOMA		M = MANDIBLE	
N = NOSE		F = FRONTAL BONE	
L = LE FORT		E = EYELID	

FUNCTION		AESTHETICS		PSYCHO-SOCIAL	
BLINDNESS	4	ANALOG	(10-x)/2	EMBARRASSMENT	1
MALOCCLUSION	3	CONTOUR DEFECT	0.5	PSYCHO PROBLEM	1
NON/MALUNION	2	DISH FACE	0.5	DISSATISFACTION	1
RESTRICTED M.O.	2	LONG FACE	0.5	>60 WD LOST	1
INFECTION	1	SCARRING	0.5	> 5 d HOSPITALISATION	1
AIRWAY OBSTR.	1	PTOSIS	0.5		5
EPIPHORA	1	EYELID DISTORTION	0.5	WORST POSSIBLE SCORE	
DIPLOPIA	1	CROOKED NOSE	0.5	ACTUAL SCORE	
		TELECANTHUS	0.5	% DISSATISFACTION =AS/WPS X 100%	
		DYSTOPIA	0.5	%SATISFACTION = 100-ABOVE	
		ENOPHTHALMOS	0.5		
	15		10		

NOTES : (Any other significant complications)

Table 5

WORST POSSIBLE SCORES

ZYGOMA : 10+8+5=23				
BLINDNESS	4	A)	LAS	5
MALOCCLUSION	2	B)	DYSTOPIA	1/2
INFECTION	1		EYELID DISTORTION	1/2
RESTRICTED MOUTH OPENING	2		CONTOUR DEFECT	1/2
			SCARRING	1/2
DIPLOPIA	1		PTOSIS	1/2
			TELECANTHUS	1/2
NOSE : 5+6.5+5=16.5				
		A)	LAS	5
MALOCCLUSION	2	B)	TELECANTHUS	1/2
INFECTION	1		CROOKED NOSE	1/2
OBSTRUCTION	1		SCARRING	1/2
EPIPHORA	1			
MAXILLA : 11+8+5=24				
BLINDNESS	4	A)	LAS	5
MALOCCLUSION	3	B)	CONTOUR DEFECT	1/2
NONUNION/MALUNION	2		LONG-FACE	1/2
			DISH-FACE	1/2
INFECTION	1		SCARRING	1/2
EPIPHORA	1		DYSTOPIA	1/2
			ENOPHTHALMOS	1/2
MANDIBLE : 8+6+5=19				
MALOCCLUSION	3	A)	LAS	5
NONUNION/MALUNION	2	B)	CONTOUR DEFECT	1/2
INFECTION	1		SCARRING	1/2
RESTRICTED MOUTH OPENING	2			

iii) Mark complications which actually occurred (patient/relatives to do the Aesthetic Scoring). The total points represent the actual score = (AS).

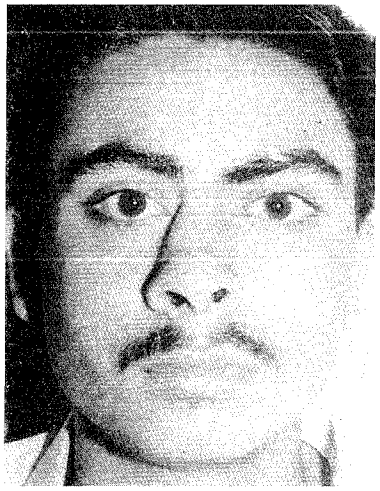
IV) Patient dissatisfaction Index = $\frac{\text{Actual Score x 100}}{\text{Worst possible score}}$

v) Patient satisfaction index = 100 - Dissatisfaction Index

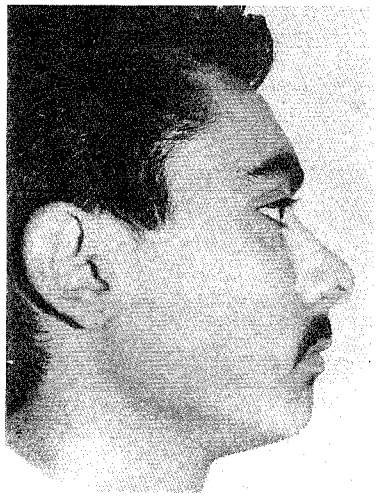
Although appearing complicated, the typical evaluation takes 15-20 minutes to perform, by the end of which both patient and doctor have a clearer understanding of each other's problems.

Some of the applications of the system will now be illustrated with reference to selected clinical examples.

Case 1 : An 18 year old unmarried college student presented with a malunited nasal fracture initially treated elsewhere (Fig. 3 & 4).



(Fig - 3)



(Fig - 4)

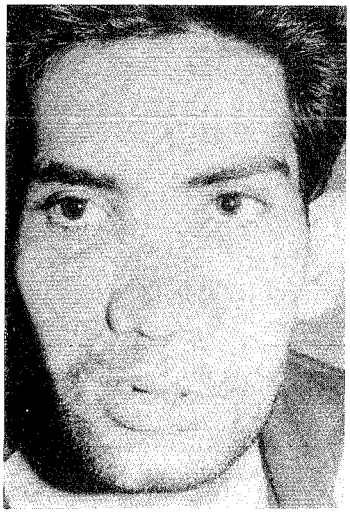
He had already had an unsuccessful attempt at secondary rhinoplasty, but seemed to be not very concerned about the result. Close interrogation during scoring (Table 6) revealed his feelings of shame and embarrassment in public, leading to deviant behaviour at college. He admitted to severe psychological distress which he was trying (subconsciously) to cover up with an air of indifference. He was obviously very dissatisfied with the manner of functioning of his previous hospital. These points would have been underestimated had we not scored him objectively. An explanation of what could be offered did much to alleviate the suspicious attitude of the family.

Table - 6

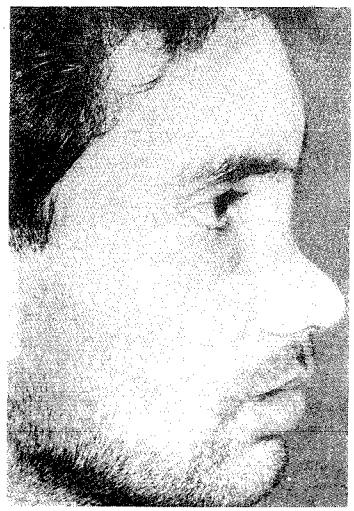
NASAL FRACTURE - N (CASE 1)

FUNCTION		AESTHETICS		PSYCHO-SOCIAL
MALUNION	(2)	ANALOG	(3)/5	(2)/5
INFECTION	1	CROOKED	(0.5)	WPS = 16.5
EPIPHORA	1	SCARRING	0.5	AS = 8.5
OBSTRUCTION	(1)	TELECANTHUS	0.5	DISSATISFACTION = 52%
	3/5		3.5/6.5	
				SATISFACTION = 48%

Case 2 : A 24 year old unmarried pharmacist had extensive panfacial fractures, the treatment of which left much to be desired (Figs. 5 & 6).



(Fig - 5)



(Fig - 6)

Although grateful for having saved him, the objective scoring brought out a host of problems and a low satisfaction - index (Table 7).

Table 7

PANFACIAL FRACTURES - ZNL (CASE 2)

FUNCTION		AESTHETICS		PSYCHO-SOCIAL
MALOCCLUSION	(3)	ANALOG	(3)/5	(3)/5
MALUNION	(2)	TELECANTHUS	(0.5)	
RESTRICTED M.O.	(2)	CONTOUR DEFECT	(0.5)	
NASAL OBSTR.	(1)	DISH-FACE	(0.5)	WSP=30
		LONG-FACE	(0.5)	AS =17
		SCARRING	(0.5)	DISSATISFACTION = 57%
		CROOKED NOSE	(0.5)	SATISFACTION = 43%
	8/15		6/10	

Case 3 : A 21 year old unmarried female had a double-fracture of the mandible with facial lacerations (Fig. 7).

(Fig - 7)

(Fig - 8)

She has been fully satisfied with the result after interosseous wiring (Fig. 8) and does not mind the minor residual scarring (Table 8).

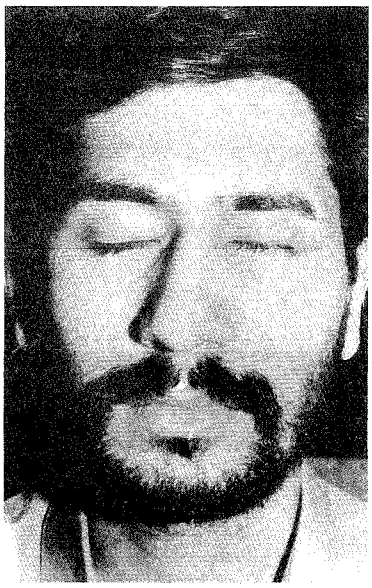
Table 8

FRACTURED MANDIBLE - M (CASE 3)

FUNCTION		AESTHETIC		PSYCHO-SOCIAL
MALOCCLUSION	3	ANALOG	0/5	0/5
NON/MALUNION	2	CONTOUR DEFECT	0.5	WPS = 19
RESTRICTED M.O.	2	SCARRING	0.5	AS = 0
INFECTION	1			DISSATISFACTION = 0%
	0/8		0/6	
				SATISFACTION = 100%

Case 4 : A 26 year old unmarried man had a full thickness tear with skin-loss of the left upper eyelid in association with a parasymphyseal fracture of the mandible (Fig. 9).

(Fig - 9)



(Fig - 10)

The result after careful repair and skin-grafting of the eyelid and simple IMF for the mandible has been most satisfactory (Fig. 10), the only cause for less than 100% patient satisfaction being mild scarring (Table 9).

Table 9

FRACTURE MANDIBLE, EYELID INJURY - ME (CASE 4)

FUNCTION		AESTHETICS		PSYCHO-SOCIAL
MALOCCLUSION	3	ANALOG	(1)/5	0/5
NON/MALUNION	2	EYELID DISTORTION	0.5	
INFECTION	1	PTOSIS	0.5	WPS = 20
RESTRICTED M.O.	2	CONTOUR DEFECT	0.5	AS = 1.5
		SCARS	(0.5)	DISSATISFACTION = 7.5%
	0/8		1.5/7	
				SATISFACTION = 92.5%

DISCUSSION

When aiming for perfection, we need to determine the results of treatment from the patient's viewpoint[1,2]. Currently employed scoring systems are of limited use in plastic-surgical patients because of the complex inter-relationships between aesthetics and function[3], and because of lack of a method to quantify the cosmetic result[4,5].

The system of analysis we have outlined has been an eye opener to us in many ways. It has led to a greater awareness on the part of all treating personnel involved as to the possible complications of a seemingly trivial injury. It has helped patients to understand the reasons behind a result deemed unsatisfactory, and has allowed them to appreciate what can as well as what cannot be done by means of secondary surgery. It has become a driving force to strive for a near 100% patient satisfactory level. But most important of all, it has forced us to realize that even the most illiterate patient expects a near-perfect result, even though he or she may be unable to express their feelings.

The routine use of such a system should allow us to define treatment outcome with greater precision and reproducibility. The next logical step would be to compare the efficacy of different modalities of treatment for the same injury.

Once a substantial database has been collected, the expected average result of a given treatment technique in the hands of a particular person can be calculated. An actuarial result repeatedly and significantly short of expected norms would then help us to pinpoint correctable deficits in treatment planning or execution.

The method described has been used for maxillo-facial injuries as a prototype by us in its early stages of development. The basic underlying philosophy, however, can be extended to almost all aspects of plastic surgery. It lends itself well to computerized data recording as well as postal questionnaire formats.

Certain complications not covered in the present scheme include wire/plate related discomfort, palatal fistula, TMJ pain/clicking, facial nerve involvement, salivary fistula, drooling and persistent CSF leak. These are to be mentioned as added notes at the bottom of the format since their inclusion in the scoring system tends to make it overly cumbersome.

The degree of weightage assigned to various complications is arbitrary and based on our personal opinion. Further refinements are expected as more experience is gained with the method.

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