

Clinical study of titanium mesh in reconstruction of maxillofacial defects

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Citation of this Article: Chandresh Jaiswara, Naresh Kumar Sharma, Vinay Kumar Srivastava, Neeraj Kumar Dhiman, “Clinical study of titanium mesh in reconstruction of maxillofacial defects”, IJDSIR- February - 2022, Vol. – 5, Issue - 1, P. No. 357 – 360.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Maxillofacial abnormalities are humiliating for patients and can have a detrimental impact on their physical and mental health, leading to serious psychiatric, familial, and social issues.

Multiple alloplastic materials have been evolved that have overcome the above-mentioned demerits. The present study was carried out to evaluate the pre and post operative clinical results of titanium mesh for the reconstruction of maxillofacial defects. Titanium's biological and mechanical qualities are undoubtedly responsible for its effectiveness in maxillofacial surgery. In fact, biomaterials like titanium have been widely reported as being able to support bone formation since

their mechanical qualities are similar to bone tissue. Titanium is a metal that is inert, non-corrosive, and malleable. Titanium also has the advantage of being visible on postoperative imaging and MRI with low distortion. In the case of major cranial abnormalities, titanium mesh cranioplasty has recently been shown to be an exceedingly safe and dependable.

Keywords: Titanium mesh, Maxillofacial defects, Reconstruction, Allograft.

Introduction

Maxillofacial deformities and defects may affect physical and psychological health of a person, potentially resulting in serious psychiatric, familial, and social problems and is a huge concern in the field of oral

and maxillofacial surgery and plastic surgery. Although, autogenic materials in surgery is generally preferred over alloplastic reconstruction, but several congenital and acquired defects still require esthetic restoration with the help of alloplastic materials. Titanium's biological and mechanical qualities are undoubtedly responsible for its effectiveness in maxillofacial surgery. In fact, biomaterials like titanium have been widely reported as being able to support bone formation since their mechanical qualities are similar to bone tissue. Titanium is a metal that is inert, non-corrosive, and malleable. Titanium also has the advantage of being visible on postoperative imaging and MRI with low distortion. In the case of major cranial abnormalities, titanium mesh with cranioplasty has recently been shown to be an exceedingly safe and dependable alternative to autografts, and even preferable to replacement with natural bone autografts. Cost and maybe aesthetic concerns due to titanium's grey colour, which becomes more evident when the soft tissue situation is not good and the dark colour shines out through the thin mucosa, are disadvantages of this metal.

Material and methods

The present prospective study was done the Department of Oral and Maxillofacial Surgery in the Faculty of Dental Sciences, IMS BHU with the facial defects. Titanium mesh was used in 64 patients. The patients were evaluated before and after treatment and the observations were recorded. Results obtained were subjected to statistical analysis was using SPSS version 20.0. Ethical clearance to carry out the study has been obtained from the institutional ethical committee.

Inclusion criteria

- Patient in general healthy condition, suffering from facial defect and deformity
- Age between 5 - 60 years
- Patients with unilateral or bilateral facial defect.
- Patient must be committed to the study and must sign informed consent and should be medically fit

Exclusion criteria

- Medically unfit patients.
- Pregnancy
- Patients not willing to participate in the study

Follow up was done as immediate post-operative, 2 week, 1 month, 3 months and 6 months after surgery to evaluate the results.

Table 1: Shows gender distribution of Titanium Mesh used in patients.

Male		Female		Total	
No. Of subjects	Percentage	No. Of subjects	Percentage	No. Of subjects	Percentage
32	31.37	32	23.357	64	26.77

Table 2: Shows mean VAS score at different time intervals.

Immediate		2 nd week		1 st month		3 rd month		6 th month		Anova statistical analysis	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	f-statistic	p-value
1.79	0.817	1.437	0.719	0.656	0.032	0.391	0.762	0.391	1.61	1.998	0.02*

ANOVA statistical analysis at different time intervals.

Table 3: Distribution of presence or absence of Pain at different time intervals.

Immediate		2 nd week		1 st month		3 rd month		6 th month		Chi square	p-value
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO		
58	6	43	21	17	47	9	55	2	62	1.71	0.04*

Table 4: Distribution according to presence or absence of Swelling.

Immediate		2 nd week		1 st month		3 rd month		6 th month		chi square	p-value
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO		
53	11	29	25	10	54	10	54	5	49	11.780	0.001*

Table 5: Distribution according to presence or absence of Allergic reaction.

Immediate		2 nd week		1 st month		3 rd month		6 th month		chi square	p-value
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO		
1	63	1	63	0	64	0	64	0	64	12.816	0.057

Table 6: Distribution according to presence or absence of infection.

Immediate		2 nd week		1 st month		3 rd month		6 th month		chi square	p-value
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO		
0	64	23	41	0	64	1	63	1	63	1.661	0.54

Table 7: Distribution according to Acceptance.

Immediate		2 nd week		1 st month		3 rd month		6 th month		CHI SQUARE	P-VALUE
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO		
62	2	64	0	64	0	61	3	61	3	1.991	0.71

Results and discussions

The results of our study were in accordance with study by Agarwal K et al. Their study also included 75% male and 25% female patients. The patients belonged to 17–30 years of age with a mean age of 21.37 years.

Postoperative pain was assessed through the visual analogue scale (VAS); the severity of pain was expressed in the form of numbers ranging from zero (representing absence of pain) to ten (representing the most severe pain). Features that were observed during wound healing include swelling, redness, hotness, pus discharge, and wound dehiscence. In order to evaluate postoperative edema, the examiner’s finger was pressed

into dependent area of patient skin for 5 seconds. The finger left an impression when removed. The pitting was graded on a scale from +1 to +4.

We observed that there was a significant decrease (p-value<0.05) in VAS score among each study group. ANOVA statistical analysis was also done to analyse intergroup comparisons between different study groups at each time interval. It was observed that there was a significant difference (p-value<0.05) in VAS score between all study groups at each time interval. It was observed that presence of pain experience decreased significantly (p-value<0.05) among patients treated in all study groups

Allergic reaction was observed to be minimum in titanium mesh in maximum patients. In the study acceptance was observed to be maximum in titanium mesh. acceptance rate got increased till 1 month and later decreased at 3rd and 6th month. The present study was conducted with low sample size. Future studies should be conducted with larger sample size. Various parameters were compared with categorical data. Further studies should be conducted using scoring criteria for different parameters for more precise readings. Future studies should be conducted comparing alloplastic grafts with autogeneous grafts for all desirable parameters. Comparison should be conducted between both the genders and age groups in terms of various study parameters.

Conclusions

Infection was observed to be minimum with titanium mesh and high acceptance. Acceptance rate got increased till 1 month and later decreased at 3rd and 6th month. Further studies should be conducted using some other scoring criteria for different parameters for more precise readings.

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