

Department of Science & Technology DST BID-HUB, PGIMER, CHANDIGARH Proposal Form

Project Title	90 degree mechanical screw driver with torque wrench for use in Maxillofacial trauma.
Principal Investigator	Dr.M.James Antony Bhagat MDS Reader, Oral and Maxillofacial Surgery Adhiparasakthi dental college and hospital, Melmaruvathur.
Co-PI	Dr. Durairaj .D Professor and HOD Oral and Maxillofacial surgery Adhiparasakthi dental college and hospital, Melmaruvathur. Dr. Suresh kumar.G MDS, Professor Oral and Maxillofacial surgery Adhiparasakthi dental college and hospital, Melmaruvathur.
Industry Partner	Adhiparasakthi dental college and hospital. Melmaruvathur Tamilnadu
Manpower	Project scientist 1, Principal project associate 1, Laboratory technician 1
Equipment	Computer for CAD CAM designing, Manufacture of screw driver and components.
Total project cost	6 – 7 Lakhs
Project Duration	1 month
Project Objectives	Development of a 90 degree ratchet type mechanical unidirectional screw driver with torque wrench for use in medical field. (Maxillofacial trauma management)
Deliverables:	Mechanical 90 degree screw driver
Novelty:	1. Mechanical 90 degree cost effective screw driver is not available for use in medical field. 2. Most oral surgical procedures are done intra orally during management of facial fracture to avoid facial scar. Screws used for fixation need to be placed at 90 degree to bone for good stable

	fracture fixation. Intra oral surgeries becomes challenging in this perspective. This screw driver helps to overcome this clinical problem.
Details of Proof of Concept:	Relevant details submitted in Abstract
Commercialization plan	Once product is developed, commercially available 90 degree ratchet screw driver for use in medical field can be used by Maxillofacial surgeons and as per need even other surgical speciality people can also use this device. Modifications as per requirements needed for further improvement of the design can also be done to increase number of customers.
Clinical Addressed/Alternative methods/Gold Standard Need	Clinical need addressed : 1.Ease of plating the Angle/ Ramus of mandible in management of mandible fracture. 2.Screws can be placed at 90 degree to the bone which improves stability across fracture and chances of screw loosening and infection. Alternative method : 1. Extra oral trocar cannula method for placement of screws is used – Disadvantage : A minimal extra oral scar and technique sensitive. 2. Motorised 90 degree handpiece and screw driver developed by high end plating systems (KLS Martin, STRYKER) Disadvantage – Affordability and accessibility
Software and Hardware Component of the project	Software to design the instrument as per our specification. Manufacture of screw driver with medical grade, autoclavable alloy of steel.

Abstract of the project.

90 degree ratchet screw driver for medical use in Maxillofacial trauma

Conceptualisation of design:

Ratchet type screw driver is commonly used in non medical field primarily (fig 1) and similar design is been applied for use in placement of dental implant.

Use in Dental Implantology:

In placement of dental implants, ratchet type screw driver is used such that dental implant can be placed into the bone at 90 degree or desired angulation. (fig 2)

Modifications to the ratchet screw driver for use in Maxillofacial trauma:

In Maxillofacial trauma most of the surgical procedures are done intra orally. This is because unlike other orthopedic fractures direct access to wound is not possible in facial region due to the scar which results from access incisions. Therefore approach is predominantly through intra oral access.

In intra oral access placement of screw at 90 degree to the bone cannot be achieved due to lack of direct access to the fracture site. This results in placement of screws at an angulation which might compromise stability of fixation , can cause screw loosening and increased chances of screw getting infected.

90 degree unidirectional ratchet screw driver is a modified design of the commercially available non medical/ dental implant driving ratchet.

Design modification:

Commercially available ratchet screw driver for non medical purpose has two components.

1. Long handle with inbuilt system for unidirectional ratcheting technology
2. An attachment at 90 degree to hold the screw

In our project the handle has to be designed longer approximately 15 cm and the attachment needs to be modified to pick up/ hold the titanium screw designed for use in bone. The handle with ratchet technology should be manufactured with medical grade alloy of steel.

Advantages

1. Precise placement of screws within the bone.
2. Since screw driver is angulated at 90 degree tissue retraction is minimalised to a greater extent. Tissue retraction results in increased post operative swelling which can be greatly reduced.
3. Operator comfort. Orienting screw driver at an angulation and placement of screw is technique sensitive. With a ratchet screw driver such discomfort can be reduced.



Figure 2 Ratchet screw driver used in dental implant – Torque wrench to measure torque required for placement of screw.



Budget Details:

Sr. No.	Items	Budget(in Lakhs)			
		1 st month	2 nd Year	3 rd Year	Total
1.	Salaries/ excluding HRA Wages	1.67			1.67
2.	Equipment	1			1
3.	Consumables	1			1
4.	Travel	0.5			0.5
5.	Contingencies	1			1
6.	Overhead Expenses*	1			1
	Total	6.17			6.17