



## Burr Hole Making with Cordless Engineering Battery Drill in Neurosurgery

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### Abstract

*For burr hole making Hand driven HUDSON BRACE, High speed electrical, Battery operated neuro drills are commonly used in neurosurgery. Neurosurgeons working in peripheral hospitals particularly developing country like india could not afford commercially available Neuro drills because of the high cost or non-availability or poor quality. Cordless engineering battery drill is a viable alternative to sophisticated Neuro drills. Availability, low cost, maintenance, service, durability makes the cordless engineering drill as a cost effective equipment in neurosurgery.*

**Keywords:** burr hole, Hudson brace, neuro drill, cordless engineering battery drill.

### Introduction

There are three types of burr hole making instruments are commonly used in Neurosurgical procedures at present: manual, electric and battery operated Neuro drills. Battery operated drill is having several advantages over other drills because of its simplicity, cordlessness, portability and lesser weight. But commercially available battery neuro drill is very costly and this article discusses the use of low cost engineering battery drill as viable alternative to other neuro drills.

### Technical note

The engineering cordless battery drill is a pistol grip handle, body and mouth piece with key less chuck with which holds the Hudson fitting perforator and burr in cranial burr hole making. The outer shell is made up of plastic which is

shock proof and covers the internal motor and circuit parts. Trigger like on/off switch and rubberized handle gives ergonomical grip. Some drills equipped with LED lights to provide illumination and the indicator light shows the real time power of the battery. The battery can be attached with the bottom end of the hand piece. Separate clutch system for forward and reverse drilling & speed adjustment is available. There is a mobile carrying case and battery charger also available with the set. We can simply put the Formalin tablets inside the carrying case for sterilisation of the drill. During surgery sterile towel or stockinette can be wrapped around the drill. After each and every use the drill is wiped with surgical spirit and put into the carrying case again.

Comparison of neuro drill, cordless engineering drill and manual Hudson twist drill

| No | Parameter   | Neuro drill   | Cordless engineering drill  | Hudson hand twist drill                                    |
|----|---|---|---|--|
| 1  | Cost  | Around 8Lacs INR [ AESCULAP, STRYKER, ADIOR] Manmanindia around 1.2 lacks | Hitachi 7.2V 7880 INR<br>Hitachi 9.6V 9109 INR<br>Hitachi 12V 11660 INR<br>Bosch 12V 5869 INR<br>Bosch 14.4V 9199 INR<br>Bosch 18V 10582 INR as on date | 5000 – 16000 INR   |
| 2  | Availability  | Metropolitan cities,wait for 2-4 weeks after order                        | Easily available in all hard ware shops   | Metropolitan cities  |
| 3  | Weight  | 1.7 kg  | 1.3 -1.5 kg   | Around 0.9 kg  |
| 4  | No load speed   | 1000 -1200  | 250 -700{7.2 V} ,0 - 1050{12V}  | 150 maximum  |
| 5  | Battery   | 2.2 Ah  | 1.2 Ah  | Hand operated  |
| 6  | Torque  | 3.95 - 4.6 NM one stage   | 26 NM 22 stage torque with adjustable clutch system   | 400  |
| 7  | Design  | Ergonomic   | Ergonomic   | No   |
| 8  | Ease of use and life  | Good  | Good  | Tiresome   |
| 9  | Maintenance   | Complicated   | Simple  | Simple   |
| 10 | Service centre  | Sent to company   | Available even in district levels   | Sent to company  |
| 11 | Cost of repair  | High  | Very low  | Low  |
| 12 | Craniotome attachment   | Available   | Not available   | Not possible   |
| 13 | Quick coupling with self - stopping cranial perforator bit,bur bit, k wires | Not fit for other manufacturers   | Keyless chuck Can hold anything according to the chuck size {0.8 -10mm}   | Not fit for other manufacturers                            |
| 14 | Sterility   | Flash autoclavable  | Formalin chamber or the plastic carrying box can be used as formalin chamber  | Autoclavable   |
| 15 | Material  | MetalAlloy  | Plastic   | Metal alloy  |
| 16 | Motor   | Closed system, can generate heat  | Fan cooled motor with vent  | Hand driven  |
| 17 | Illumination  | No light available  | LED illumination available  | No light available   |
| 18 | Bone necrosis at drilling site  | Saline irrigation needed  | Saline irrigation needed  | No bone necrosis   |
| 19 | Surgery time  | Shortest (5 -8 seconds for one burr hole)                                 | Shorter (1 – 2 minutes for one burr hole in our experience)   | Longer (2- 4 minutes for each burr hole in our experience) |
| 20 | Dural tear  | Very rare   | Very rare   | Not un-common  |

Ah = Ampere-hour, Nm = Newton metre, RPM = Revolutions per minute

Cordless engineering battery drill coupled with bur



Carry case can be used as formalin chamber without charger



Cranial perforator coupled with Cordless engineering battery drill



HUDSON cranial twist drill set with SCOVILLE trephine

HUDSON BRce with extension rod with bur

Self stopping Hudson fitting cranial perforator can be used with cordless engineering battery drill

Battery neuro drill set



**Discussion**

The advantages of cordless engineering drill are

1. Low cost around 5000 INR which is 3 times cheaper than good quality Hudson brace, 20 times cheaper than Indian made cranial drill system and 200 times cheaper than foreign made neuro drill system.
2. Designed for hard use wood, stone, metal and etc., hence strong and robust. so, malfunctioning is very rare in soft use neuro surgical field.
3. In slow speed below 700 rpm bone necrosis and post op ring sequestrum not possible.
4. Surgeon can manoeuvre the cordless drill in any needed direction with ease.

The major disadvantage of cordless engineering drill is 1. Sterility is one of the only disadvantages because plastic body is not autoclavable. This can be overcome by thorough cleaning with surgical spirit. Superficial hot steam with electrical garment steamer after removing the battery and formalin tablet can be used for fumigation.

2. Craniotome attachment not possible.

**Conclusion**

The cordless engineering battery drill has got several advantages over highly sophisticated neuro drill in making burr-hole procedures. The major disadvantages are not autoclavable, craniotome attachment not present. But with minimal cost, comparative function, durability, maintainance, manoeuvrability in surgeon's hands and without post-operative complications can be used in routine burr hole making in low resource setting countries at-least in emergency which is life-saving in neurosurgical field

**References**

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