

Feasibility of Linear Scalp Incision in Neurosurgery: A Quick Review

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It has been always a conflict of interest when planning for cranial neurosurgical approach to choose between the linear incision and the conventional flap incision that we used to do in neurosurgery.

Characteristic anatomy of the scalp (consist of five distinct layers) and the nature of its blood supply have always been considered with caution in neurosurgery when planning for scalp incision to approach any intracranial lesion and this is elaborated even more previously by the expert people of this discipline. Other important third issue also has been considered seriously is the langer's lines of the scalp and the effect of that in wound healing and the aesthetic consideration for patients. One of the most interesting area to discuss in neurosurgery; is the surgical approach with the most important part of it; is the planning for skin incision and the configuration of the scalp skin flap, taking into consideration the three previously mentioned points. They are many skin incisions and flaps in neurosurgery mentioned in the literature and operative books and most of neurosurgeon have their own plans for skin incision.

In general, the feasibility of any scalp skin incision depends mainly on the general aim of surgery; so it differs when planning for superficial lesion versus deeply seated lesion. Size and site of the lesion is critical. The commonly used type of scalp skin incisions in neurosurgery either flaps (and they are many and commonly

used) or linear incisions (which are less used and they debated a lot for their feasibility in cranial surgery) for example, when plan for superficial small cranial lesion, the aim is always to have good wide exposure to the lesion and its periphery and so skin flaps are usually used. But when plan for small superficial or deep lesion; the so wide opening is not necessary, and here comes the conflict of interest of using linear incision for skin and craniotomy for such type of lesion so as to avoid the disadvantages of the skin flaps that were usually experienced, and to get the benefits seen with the linear incisions taking into consideration not to compromise the adequacy of the access to the lesion and surgeon comfort with this choice.

The main problems seen with the skin flaps were the compromization of the blood supply and so wound healing. But they are good in access and providing adequate surgical field. In contrast, linear incisions are always thought to have less adequate or uncomfortable access and exposure to the surgical field and so many of neurosurgeons do not like them neglecting their advantages that have been described in literature. Linear incision has the advantages of the rapid access to the lesion with less time consumed for that and gaining this time for other important steps in the surgery [1]. This is explained in the literature by a study conducted by William., *et al.* in retro mastoid approach in comparison to the commonly used curvilinear incision [1]. They mentioned that the

desired craniotomy is not large and the anatomical nature of the region makes such incision the optimum. Linear incision has been tested also for the frontal region especially the forehead [2]. In this study by Anegawa, *et al.* the conclusion was linear is better than bicoronal [2]. Their comment was the linear is safe, efficient with less complications and best in the aesthetic result which is very important consideration during the surgery in the forehead. Other particular advantage for the usage of linear incision is mentioned in application of a Magnetically Coupled Bone-Anchored Hearing Implant [3]. The study is conducted by Barry, *et al.* with the benefits mentioned in such situation were the small incision, less hair removal and less pain [3]. Abiodun, *et al.* in their article showed that linear incision is used in (24.5%) patients in comparison to the famous question mark type in (26.4%) patients, and consider linear incision as the second most commonly used [4]. Such study show a growing interest for the use of linear incision in cranial surgery recently especially after the advantages reported about the linear incision one of the famous neurosurgeon named Aaron cohen-gadol talked about the utility of the linear incision and its benefits highlighting the flexibility and the extendibility of linear incision for any possible further surgeries such as recurrence [5]. Also he mentioned the good healing outcome and the cosmetically acceptable result of the linear incisions.

In retrospective clinical study about the Effects of Linear Scalp Incisions on Intraoperative and Postoperative Morbidity which aimed on patients' surgical comfort and wound healing when linear incision is utilized, and the conclusion was linear incision in the supratentorial superficial lesion with size (≤ 5 cm) can be used instead of other incisions [6].

Disadvantages of linear incision have been also mentioned in the literature; one of the mentioned in the literature is that linear incision has large bad scar [7].

In conclusion; whether we use flap or linear skin incision, the general principles of scalp skin incision should be considered, aiming to avoid complications and get the best desired outcome. Such principles are the cut to the skin should be sharp with scalpel and perpendicular to it without undermining, incision should be with plane of langer's lines, do not interrupting with the major blood supply and in case of flap incisions the width should be wider than the height.

In general linear incisions are quick to do with less injury to the blood supply, flap incisions are more time consuming to do and to close with greater risk to compromise scalp blood supply especially if not done appropriately. As neurosurgeon we should consider such comparison result and to consider the two options when planning for cranial surgery taking into account the general rules that validate the use of one over another aiming to have the best exposure to the surgical field and lessen the complications expected and maximize the healing and cosmetic outcome.

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