A COMPARATIVE STUDY ON DIFFERENT TECHNIQUES FOR RECONSTRUCTING THE THUMB

Thesis

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In General Surgery

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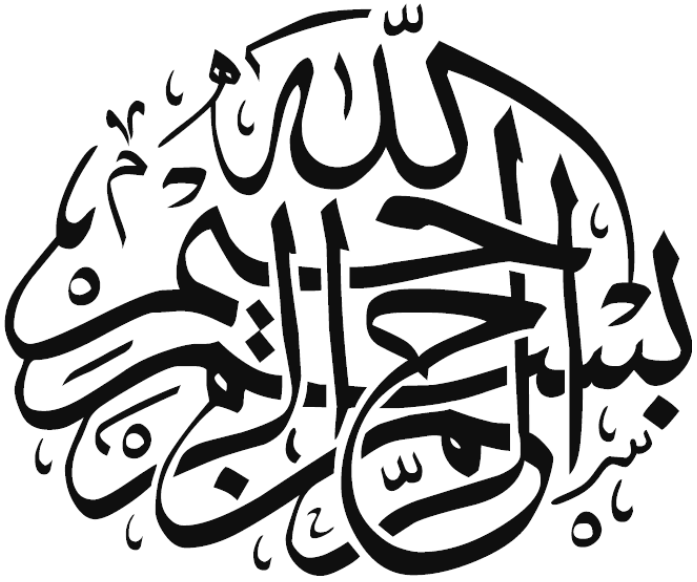
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Dedication

To God & To my Family

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ABSTRACT

In this study, Thirty-five for reconstructing the thumb due to post-traumatic and post-burn etiology, were performed. Methods of reconstruction included primary sutures, grafts, flaps, microsurgery and metacarpal bone lengthening by distraction.

Evaluation of the results was done by, safety coverage, preservation of both form and function of the thumb, donor site **(**if present) morbidity, cosmetic appearance, complications, period of hospital stay and satisfaction of both the patient and the surgeon.

Keywords

- Thumb.
- Primary sutures.
- Grafts.
- Microsurgery.
- Distraction.

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INTRODUCTION

Reconstruction of different body defects has been one of the real tests for the plastic surgeon **(Cobbet, 1976**). The primary goals of reconstructive surgery are restoration of form and function with subsequent enhancement of quality of life **(Mathes & Nahai, 1997**).

Before development of antibiotics, a conservative approach was generally taken to wound closure because of the risk of infection and the potential for tissue loss at the wound edges. Wound debridment was therefore limited to removal of well demarcated non viable tissue to avoid enlarging the wound. Local wound care promoted healing through wound contracture. The resultant scar was frequently associated with contracture and skin instability. With the advent of antibiotics following the development of sulphonamides and penicillin in the mid-twentieth century, control of local wound infection permitted a more aggressive approach to wound closure. The intial use of pinch graft and later split thickness skin graft allowed successful closure of large wounds. More complex wounds with circulatory impairment, chronic infection and composite defects, however, were unsuitable for skin graft coverage. These wounds could not be adequately managed until flaps were developed. It soon became apparent that flaps could be transferred using normal tissue with intact circulation from an area of non-injury called the donor site to cover complex wounds **(Mathes & Nahai, 1997)**.

Flaps may include skin and subcutaneous tissue, local muscle, musculocutaneous, fasciocutaneous and free flaps according to its indication. Interest in various forms of flaps is steadily increasing among surgeons and if it is correctly chosen, it gives an excellent solution for many challenging soft tissue defects. The ideal flap for coverage has to provide matched skin with good, sufficient padding sensibility and resistance to shear forces **(Tolhurst, 1984)**.

In general, all these techniques aim at restoring the functional and cosmetic limb. The etiology, extent of injury, age of the patient and his occupation dictate the ideal flap to be used in reconstruction. Each of the available flaps has advantage and disadvantage **(Inoue et al., 1988).**

Historical Background

The compelling drive of human beings to reconstruct deficient or missing parts and the desire of victims to undergo such reconstruction are best appreciated by recognizing the early development and use of pedicled flap transfer long before advent of anaethesia. The seminal work of Sushruta in the pre-christian era must have resulted in major success, however, the basic principle behind the Indian flap is so sound that the process is still used in the contemporary surgery **(Wallace, 1978).**

From those early developments, at first slowly then like a wild fire in the last four decades, the world has witnessed enormous progress in tissue transfer surgery. The first successful transfer of human tissue to heterotrophic sites was done by now what called pedicle techniques. Such transfer are never even transiently, deprived of blood supply. Thus on a trial and error basis, it should not be a surprise that the success of the Hindu Sushruta during the pre-christian era depended on the use of pedicled flaps of tissue.

It appears to have taken centuries for the principle and the procedure itself to travel from its origin in India to Europe first to Brancas in Italy, who became known in the fifteenth century for the use of the technique and the principle to develop new and imaginative reconstructive procedures. Tagliacozzi in the sixteenth century made use of the printing press to disseminate knowledge of the techniques abroad through his celebrated De Cutorum Chirurgia published in 1597. Nonetheless, the procedure lay dormant for 200 years until a newspaper, the Mardas Gazette and the gentleman's magazine reported the Indian method for tissue transfer among others. Carpue in England and Von Graefe in Germany further developed the technique in Europe. Zies in his 1830 description of the procedure displayed an illustration suggesting the dusky appearance of the flap early after surgery. Warren was the first in the United States to publish this technique in 1837 in the Boston Medical and Surgical Journal.

During the nineteenth century, in 1829, Fricke of Hamburg published a book describing many alternate facial flaps. Shortly thereafter, Tripier, Malgaigne, Burrow, Estlander, Von Graefe, Abby, Denonvielliere, Rosenthal, Dieffenbach and Zies added further innovations in the shift of tissues to adjacent areas for reconstruction **(Chase, 1998).**

Hamilton of Buffalo reported the first successful cross leg flap in 1854, he also was the first to apply the principle of delay to flap transfer **(Prince, 1868).** Advancement in knowledge in use of distant flaps was

done also by Shrady 1891, who used contra-lateral index finger to cover a cheek contour defect and by William Stewart Halsted, 1896, he transfered a flap from the abdomin to the neck of a burn victim.

The renowned Sir Harold Gillies stated that a flap should not be larger than the width of its carrying pedicle and that if a longer flap is to be raised, its base should contain a large vascular pedicle **(Gillies, 1920).** John Staige Davis, 1918 reporting World War 1 experiences, expanded the uses of pedicled flaps, later William Germany, et al, 1933 explored the vascular anatomy of skin and subcutaneous tissues important in designing such flaps.

Jhon Ronerts, 1919 pointed to the lessons learned in the war and applicable to reparative surgery using pedicle flaps in the hand. McGregor and Jackson, 1970 described the delto-pectoral flap in hand surgery. Classification of flaps according to the nature of the pedicle started by McGregor and Morgan in 1960 **(McGregor & Jackson, 1970).** McGregor and Jackson, 1972 proposed that one could outline the vascular territories. McGregor, et al, 1972 described the anatomical basis for a flap based on the superficial circumflex iliac vessels, the groin flap, which became one of the important flaps in reconstructing hand defects **(Lister et al., 1973).** McGregor and Morgan applied the term random and axial to flaps in 1973.

Buncke and Schultz in 1966 worked tirelessly with methods to improve sutures and materials. Komatsu and Tamai succeeded in thumb replantation in 1968. This procedure is now well established in hand surgery **(Chase, 1998).** There followed a rash of free groin flap transfers in hand surgery **(Daniel & Weiland, 1982).**

The feasibility and growing reliability of free flap transfer will have a wide range of applications in reconstructive surgery. There appear to be inexhaustible imaginations among surgeons developing new and innovative flaps for use in every part of the body. Progressive liberation from the large carrying pedicle to the refined vascularized free flaps has opened the way for near infinite variations in flap design **(Chase, 1998).**