The Krukenberg Hand – A Case Report

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The Krukenberg operation involves surgical separation of radius and ulna in a hand or forearm amputee. The purpose of this procedure is to provide pinch who are neurologically intact and have a functional forearm and upper extremity but are missing one or both hands. The advantage of this procedure is that it creates pinch that allows skillful manipulation without need to visually monitor it. We found a case of 30 years old man with complaints gangrene over left hand for two months who was an intravenous drug abuser. We performed Krukenberg operation under general anaesthesia which is described in this case report. Preservation of skin sensation at the gripping surfaces together with precise and powerful movement make this operation superior to any prosthesis.

Key words: Krukenberg hand

Introduction

The hand performs a verity of complex functions. Loss of one hand results in severe degree of handicap and it increases exponentially with loss of both hands. As no prosthesis can ever compensate for all functions of the hand, its loss leads to devastating consequences. In 1917 Krukenberg, a German army surgeon first described a technique of operation that converts a forearm stump in to a pincer that is motorized by Pronator Teres muscle that is called Krukenberg operation. In this operation radius and ulna are separated into two jaws of a “crocodile” forceps, with tactile sensibility. This procedure has been used successfully in developing countries that lack the means to obtain expensive prosthesis (fig-1).

Figure 1. A man writing with Krukenberg hand.

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Case Report
A 30 years old man, (Reg no: 82/5-8-2010) was admitted in the Department of Orthopaedic & Traumatology, Dinajpur Medical College Hospital with complaints of gangrene over left hand for 2 months. From history we came to know that he was intravenous drug abuser (fig-2).

Figure 2. Gangrene over left hand.

Patient explained that he was quite well 2 months back. Then an ulcer developed on the dorsum of the left hand. Gradually the ulcer extended over all fingers of the same hand. He took surgical treatment from village doctor. After that wound extended all over the hand upto wrist and gangrene developed. Giving proper information to patient and relatives and considering benefit of the patient Orthopaedics and Traumatology department, Dinajpur Medical College Hospital decided to perform Krukenberg Operation. On 4 September 2010 Krukenberg operation had done under General anesthesia.

Pre-operatively below elbow amputation stump was examined thoroughly for adequate vascularity, availability of healthy skin, adequacy of length, strength of muscles and movements at elbow and radio-ulnar joints. For ideal Krukenberg stumps, length of base from elbow crease should be 8 cm and length of two prongs should be 12 cm from base. The skin incision was placed 1 cm medial to midline anteriorly. On the posterior aspect, the incision was made in the midline and its proximal end was turned medially at right angle. Distally, both incisions were joined in midline at tip of stump. Incisions were deepened and muscles were separated into two equal halves. Interosseous membrane was divided to separate radial and ulnar prongs gently (fig-3). Muscles were sutured over the tip of the bones. Ulnar stump was closed by skin and split skin graft was placed to close radial stump without tension (fig-4).

Figure 3. Muscles and interosseous membrane was dividing to separate radial and ulnar prongs.

Figure 4. Placement of split skin graft.
Figure 5. Changing of dressing over the Krukenberg hand.

First dressing was changed on fifth day and second on tenth day (fig-5). After wound healing, movements in closing and opening of the radial and ulna stumps to achieve pincer and grasping effects started.

Discussion

The Krukenberg procedure offers the patient a permanent workable alternative. In this procedure pincer grip is obtained by apposing the radius to fixed ulna. The main advantage of the pincers is their versatility. The tactile sense enables the patient to perform daily task independently. It is contraindicated where the patient is mentally unstable or has not been able to accept the procedure after adequate psychological preparation. There is no available prosthesis compares with the flexibility of the Krukenberg pincers especially in day to day activities and light work. In developing countries the Krukenberg stump offers the patient a permanent hand - which he may use at any time.

References