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Rehabilitation of the upper limb amputee

I. FLETCHER

In Great Britain the majority of upper extremity amputations are the result of trauma – industrial trauma! The patient is usually a healthy man who needs to work, who *wants* to work! He is anxious to know whether he will be able to return to his original occupation. He *must* be reassured at the *earliest* possible moment. This is the first stage of his rehabilitation and it is vitally important to tell him what he will be able to do with the aid of an artificial arm. It is also advisable to explain that a prosthesis is very different from the human limb which he has lost.

It is often helpful for him to meet another arm amputee who can demonstrate the workings of the prosthesis. When *both* arms have been lost it is an essential part of the patient's rehabilitation to meet a proficient bilateral prosthetic wearer.

Fortunately, unilateral amputation is more common but such patients will become one-handed quickly if not treated promptly.

We strongly advise early movements of the remaining joints of the amputated limb, on the same day if possible. When there is a forearm stump the occupational therapist can fit a light leather cuff into which a spoon may be attached and the patient can use this at his first meal following the amputation. A pen or pencil may also be fitted into the cuff but I do not advise *writing* until control has been acquired. Teach him to play noughts and crosses. This is a game as well as an exercise. Let him draw quite large frames and symbols which comprise vertical lines, horizontal lines, diagonals in two directions and circles. May I also mention that in order to draw and write one must have normal *shoulder* muscles but a hand is not necessary! Painting is another acceptable method of learning co-ordination and fine control.

From the day of amputation until a prosthesis is supplied the stump should be bandaged. After the sutures are removed, bandaging should be done three times a day. About three or four weeks later a plaster cast and measurements of the stump are taken so that a prosthesis can be made. The patient subsequently attends the Arm Training Unit where an occupational therapist gives him instructions about stump hygiene and the care

of his prosthesis, how to put it on and operate the controls. We have various work benches so that the men may perform such activities as woodwork, metalwork and repairs on electrical household appliances. They can also dig in the gardens or stay indoors and play solitaire.

The most useful and versatile tool is the split-hook, of which there are numerous designs. We also supply other terminal appliances both active and passive.

Over the centuries many types of mechanical hands have been made. Some are truly wonderful pieces of craftsmanship but they lack the most important attribute of the human hand – *sensation*. Consider how useless your own hand would be without the exquisite sense of touch.

The upper extremity has a *very* wide range of functions from the delicate skill of the watchmaker to the muscular might of the javelin thrower. Let us consider for a moment the uses to which we put our own hands each day.

Washing – shaving – dressing – fastening buttons – eating – driving a car. Then in the clinic: shaking hands – writing – using a telephone – palpation – percussion and handling money.

When the hand is lost the eyes take the place of sensibility, therefore the terminal device must be small and neat so that it does not obscure the working field, that is why the split-hook is well accepted for many activities while the hand is reserved for dress wear.

Time permits me to make only brief reference to the myoelectric, and other types of externally powered prostheses. Let me do this by asking a question: “Why use *external* power, which is *not* reliable, when the amputee has his *own* muscle power which is always with him?” Arm amputees use their prostheses as hammers – they want them to be robust and reliable. Personally I do not favour the myoelectric prosthesis in its present state but I do prescribe carbon dioxide gas powered limbs for children with bilateral amelia.

A few words now concerning people with severe lesions of the brachial plexus. More than 200 of my patients have had such injuries. Most of those with *complete* and *permanent* paralysis of the limb have elected to have an amputation which is usually combined with an arthrodesis of the shoulder. Such treatment offers a better functional result than any reconstructive surgery. I hasten to add, however, that the clinician must have a very full discussion with the patient before such a decision is reached because not everyone with a complete lesion will benefit from an amputation.

Summary

The commonest cause of amputation of the upper extremity, in Great Britain, is industrial trauma. The patient must be told what to expect from a prosthesis as soon as possible. It is helpful to meet an amputee who uses an artificial arm. This is particularly important when both arms have been amputated.

When there is either a forearm or arm stump, joint movements must be commenced within hours. A leather cuff may be fitted the same day as amputation to hold a spoon for eating and later a pen or pencil. The game of noughts and crosses is a good exercise, both physical and mental. Painting also develops limb control. The Arm Training Unit has work benches where amputees learn to use the prosthesis for many activities. The recommended terminal device is the split hook although there are others for special purposes.

Externally powered prostheses and mechanical hands are considered to be unreliable and clumsy for the majority of upper limb amputees who probably work in factories. When they have a stump they have all the power they need. Powered prostheses are reserved for the severely handicapped congenital patients with amelia.

Brief mention of the fact that over 200 patients with lesions of the brachial plexus had been treated. Many had complete lesions and they were using prostheses following amputation and, in most cases, arthrodesis of the affected shoulder. Warning that amputation for such cases must not be advised without long and careful discussion with the patient.

Talk illustrated with a few slides and terminated with a silent film of upper extremity amputees, bilateral and unilateral, in action.

Zusammenfassung

In Grossbritannien sind Arbeitsunfälle der häufigste Grund für Amputationen im Bereich der oberen Extremität. So früh wie möglich muss der Patient darüber informiert werden, was er von der prothetischen Versorgung erwarten kann. Es ist dabei zweckmässig, den Patienten mit anderen Amputierten, die bereits Prothesen tragen, zusammenzubringen; dies gilt besonders für doppelseitig Amputierte.

Ist ein Vorderarm- oder ein Oberarmstumpf vorhanden, so muss bereits innerhalb der ersten Stunden nach der Amputation mit Bewegungsübungen begonnen werden. Noch am Tag der Amputation wird der Patient mit einer Ledermanschette ausgerüstet, die es ihm erlaubt, einen Löffel zum Essen oder eine Feder zum Schreiben zu halten. Sehr gute Übungen sind Schreibspiele – sowohl physisch wie psychisch –, Malen und Arbeit an der Werkbank, an welcher die Amputierten lernen, ihre Prothesen für die verschiedensten Zwecke anzuwenden. Als definitive Prothese wird der Spreizhaken («split hook») empfohlen, für spezielle Bedürfnisse kommen natürlich auch noch andere Prothesen in Frage.

Von aussen gesteuerte Prothesen und mechanische Hände haben sich für Fabrikarbeiter als zu störanfällig und unpraktisch erwiesen. Diese stellen aber die grosse Mehrzahl unserer Patienten. Ist ein Stumpf vorhanden, so besitzt der Patient selbst genügend Kraft für alle vorkommenden Beschäftigungen. Gas- oder myoelektrisch gesteuerte Prothesen kommen nur in Frage für kongenital schwerst Geschädigte mit Amelie.

Es wird auch kurz über mehr als 200 Patienten mit Armplexusverletzungen berichtet. Viele davon hatten komplette Läsionen, mussten amputiert und meist im Schultergelenk arthrodesiert werden und benutzen heute Prothesen. Die Amputation darf jedoch in diesen Fällen nur nach langen, mit grösster Sorgfalt durchzuführenden Diskussionen mit dem Patienten empfohlen werden.

Der Vortrag wurde illustriert mit Diapositiven und einem Film, der die verschiedensten Aktivitäten der ein- und doppelseitig Amputierten veranschaulicht.

Résumé

L'accident de travail est en Grande Bretagne la cause principale des amputations du membre supérieur. Il faut révéler au patient le plus tôt possible ce qu'il peut attendre d'une prothèse; et cela est utile de lui faire rencontrer un amputé qui se sert d'un membre artificiel. Ceci est particulièrement important lorsqu'il s'agit d'un amputé des deux bras.

Qu'il s'agisse d'un moignon de l'avant-bras ou du bras, il faut commencer avec les mouvements coordonnés dans les premières heures qui suivent l'amputation. L'on peut le jour même de l'amputation adapter un manchon en cuir permettant de tenir une cuillère et plus tard une plume ou un crayon. Le jeu anglais consistant à dessiner des ronds et des croix est un bon exercice, aussi bien physique que mental. La peinture développe également le contrôle des membres. Le département pour l'exercice des amputés des bras a développé des établis où ces amputés apprennent à utiliser leur prothèse pour des activités multiples. La prothèse définitive à recommander est le crochet, bien qu'il y ait d'autres formes mieux adaptées à des activités spéciales.

Des prothèses maniées de l'extérieur, ou des mains mécaniques ne sont pas d'un emploi sûr, et même gênantes pour la plupart des amputés des bras, qui en général travaillent dans une fabrique. Avec le moignon qu'ils ont, ils ont toute la force dont ils ont besoin. Des prothèses mécaniques devraient être réservées à des patients handicapés congénitaux avec amélie.

L'auteur mentionne brièvement le fait qu'il a traité plus de 200 patients atteints de lésions du plexus brachial. La plupart emploient des prothèses après arthrodèse de l'épaule correspondante. Et il rappelle que dans de tels cas l'amputation ne peut être faite qu'après une discussion exhaustive et de longues explications avec le patient.

C'est avec quelques diapositifs et un film muet montrant des amputés d'un ou des deux bras en activité que l'auteur termine son exposé.

Riassunto

L'incidente sul lavoro rappresenta in Gran Bretagna la causa principale delle amputazioni del membro superiore. È necessario spiegare al paziente il più presto possibile quello che può aspettarsi da una protesi; è anche molto

utile di presentargli un amputato che si serve già di un membro artificiale. Questo è della massima importanza se si tratta di un amputato alle due braccia.

Che si tratti di un moncone dell'avanbraccio o del braccio, è necessario cominciare con dei movimenti coordinati durante le prime ore che seguono l'amputazione. Il giorno stesso dell'amputazione si può già adattare un manicotto di cuoio che permette di tenere un cucchiaino e più tardi una penna o un lapis. Il giuoco inglese che consiste nel disegnare dei cerchi e delle croci rappresenta un buon esercizio tanto dal punto di vista fisico che mentale. Anche la pittura sviluppa il controllo degli arti. Il dipartimento per l'esercizio degli amputati alle braccia ha sviluppato dei banchi dove questi pazienti imparano ad utilizzare le loro protesi per delle attività molteplici. La protesi definitiva da raccomandare è quella con l'uncino, anche se esistono altre forme più adatte a delle attività speciali.

Le protesi maneggiate dall'esterno o le mani meccaniche non sono sicure nell'uso, anzi persino scomode per la maggior parte dei pazienti amputati alle braccia, che generalmente lavorano in una fabbrica. Con il loro moncone, posseggono tutta la forza di cui hanno bisogno. Le protesi meccaniche dovrebbero essere riservate ai pazienti con difetti congenitali ad amelia.

L'autore accenna brevemente al fatto che ha trattato più di 200 pazienti con lesioni del plesso brachiale. La maggior parte si serve di protesi in seguito ad artrodesi della spalla corrispondente. Esso ricorda inoltre che in tali casi l'amputazione non può essere fatta che dopo una discussione approfondita e dopo lunghe spiegazioni con il paziente.

L'autore termina la sua comunicazione con alcune diapositive e con un film muto che mostra degli amputati di uno o due braccia in attività.

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