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ARTHRODESIS OF INTERPHALANGEAL JOINTS AND FIXATION OF PHALANGEAL FRACTURES IN TRAUMA-PRELIMINARY REPORT OF A SIMPLE TECHNIQUE

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SUMMARY

An improvised external fixator consisting of 'K' wires and acrylic resin was used in five cases of finger trauma. Rigid fixation with compression for arthrodesis was used in two cases to restore functional finger position; in three cases the same method was used to fix phalangeal fractures. Results were excellent and the method proved simple and rewarding.

Restoring finger viability and achieving its functional position ultimately gets priority over structural 'integrity' of its anatomic components in badly crushed fingers. With good metacarpo-phalangeal flexion and extension, stiff interphalangeal joints in flexion at functional position are dispensable and as a matter of fact should be the basis for management of the badly crushed fingers.

The distal interphalangeal joints should be fused at 10-15 degress of flexion and the proximal interphalangeal joint at 40-55 degrees flexion. Fusion of the later is more frequently indicated and the utility of such a procedure is best in the index finger (James Urbaniak, 1983). In attempting arthrodesis, the surgeon's aim is to obtain a painless union in the appropriate position in a reasonable period of tmie (Moberg, 1960).

Materials and Methods

Of the five patients treated two had badly crushed right index finger. The fractures were compound with suspect distal viability. The fractures involved the proximal interphalangeal joints. Therefore arthrodesis of the proximal interphalangeal joint in functional position was contemplated after thorough debridement. Opposing bone ends were chiseled for maximal contact. Two transverse 'K' wires were driven through the proximal and middle phalanx little away from the proposed site of arthrodesis. With the surgeon maintaining the compression and position of function the assistant mixes the acrylic resin. When sticky it was connected to the 'K' wires until it set. At this point the 'K' wires are secure and the position is maintained. Skin is then loosely approximated with minimal dressings.

The same method was used to fix transverse phalangeal fractures in three cases.

Figures (2) and (3) show badly displaced right index proximal phalanx fracture treated by the external fixator.

Figures (4) and (5) show pre-operative and late post-operative X'rays of proximal phalanx fracture of the left little finger treated by this method.

The compound 'Acrylic Resin' formed is obtained by mixing the polymer and monomer in adequate proportions. The polymer consists of acrylic acid ($CH_2 = CHCOOH$). The monomer is a liquid consisting of methyl methacrylate and hydroquinone (.0006%).

Observations

There was no infection in any case. The procedure did not in any way compromise the suspect initial distal viability. Hence finger viability was restored. The 'K' wires were removed by cutting the acrylic resin. Arthrodesis was perfect, following 'K' wire removal

after four weeks. The infection free wound enabled the patient to use his finger after 14 days for activities like writing (Fig 1), and also eating, driving scooter etc. Compression ensured security of arthrodesis.

Discussion

Fusion of interphalangeal joints have been achieved by various methods from the use of a single intramedullary 'K' wire to complex external fixators. Prior to the first world war, the single intramedullary 'K' wire was common. However since Sterling Bunnel (1944) suggested two 'K' wires which were crossed, this has continued to be the popular method. Messengill (1979) demonstrated that four eccentrically placed thin 'K' wires provide much better fixation. However it has been proved that the bones are not large enough to accept four pins, and therefore two carefully engaged ones ensure rigidity (Granovitz, 1966). Intraosseous wiring supplemented by single 'K' wire has also been preferred (Lister, 1978). Based on the principle of compression osteosynthesis the tension band procedure has been popularised in interphalangeal arthrodesis

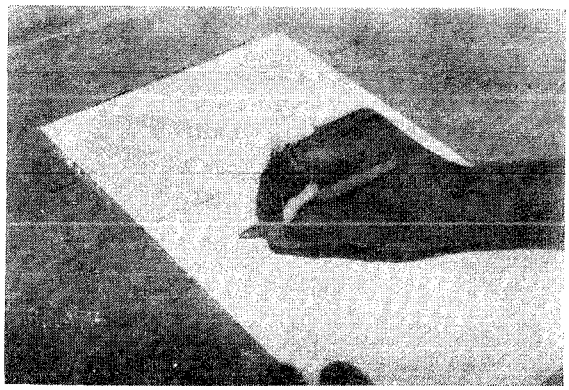

Fig. 1. Photograph of patient using right hand with 'external fixator' in position.

Fig. 2. X'ray photograph showing badly displaced proximal phalanx fracture.

Fig. 3. X'ray photograph showing improvised external fixator in position.

Fig. 4. X'ray photograph of fracture left little finger, proximal phalanx.

Fig. 5. Late post-operative X'ray photograph of the fracture in Fig. 4 after fixation with external fixator.

(Allende, 1980). Self compression plates provide rigid fixation, but excessive amount of space is needed in a limited subcutaneous area (Paneva, 1977).

Successive authors have devised miniature external fixators for arthrodesis (Leonard 1979), (Tupper, 1972). Wexler (1977) used dorsoventral 'K' wires and rubber bands. Dickson (1975) reported on rigid fixation of unstable metacarpal fractures using transverse 'K' wires banded by acrylic resins.

Results

Our method of finger salvage with functional restoration by interphalangeal arthrodesis using compression is a simple one.

The procedure can be accomplished under digital block. The bony ends are not traversed by the 'K' wire and hence chances of infection are less. Where distal vascularity is suspect, the procedure can be accomplished by minimal tissue trauma.

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