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HAND INFECTIONS; FREQUENCY, INFECTING ORGANISMS AND RESIDUAL COMPLICATIONS.

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ABSTRACT... irfanshukr786@yahoo.com. Hand infections are the prime cause of loss of working hours for manual workers and housewives. The objective was to study different types of hand infections, infecting organisms and to find out different residual complications. This prospective study was carried out at C.M.H., Peshawar from March 1, 2000 to March 1, 2003. All patients above 12 years were included in the study. Diabetics, immunosuppressed patients, drug addicts, and patients on steroid or cytotoxic therapy, were excluded from the study. Other exclusion criteria were crush injuries, burns, compound fractures and skin lacerations. The diagnosis of hand infection was based on history, physical and roentgenographic examinations of the hand. All the patients were put on Cloxacillin & Gentacin and their affected hands were elevated. In cases of suppuration, surgical drainage was done & pus was sent for C/S. Early physiotherapy was instituted & residual complications were recorded. Relative frequencies of different types of hand infections in 176 cases included Paronychia (22.16%), Cellulitis (21.02%), Felon (19.32%), Proximal & Middle Volar Space infection (16.48%), web space infection (14.77%), Thenar Space Abscess (3.41%) and midpalmar abscess (1.70%). Frequencies of hand infections in adolescents, young, middle and elderly patients were 14.77%, 52.84%, 25% and 7.39% respectively. There was no significant difference in frequencies of hand infection amongst males and females. The percentages of right hand and left hand involvement were 57.38% and 42.61% respectively. The ratio between manual workers and other patients of hand infections was 2.5:1. Staphylococcus aureus was detected as a single offending organism in most of the cultures (62.59%) and stiffness was the leading complication (14.20%). The frequency of complications was significantly more in elderly patients (53.28%) but there was no significant difference of complications amongst males and females.

Key words: Hand, Infection/complication, Microorganism z, Staphylococcus aureus, Drainage, Cloxacillin, Gentamycin.

INTRODUCTION

Hand infections are common and in the absence of appropriate management, can result in serious and permanent disability^{1,2,3,4,5}. Paronychias and Felons are

most commonly encountered hand infections^{6,7}. Severe infections of the hand are less common than formerly⁸. Lymphangitis, deep fascial space abscesses and acute suppurative tenosynovitis are major infections⁷, the

incidence of which has decreased to 25 to 30 percent of what it was before antibiotics⁹. The commonest offending organism is staphylococcus aureus¹⁰. The hand surgeon is encountering increasing number of gram negative and mixed organism infections¹¹. Stromberg¹² described that recurrent and persistent hand infections were most frequently caused by mixed gram negative and gram-positive organisms but at times anaerobes, fungi or mycobacteria may be responsible.

Hand infections often resulted in severe disabilities including stiffness, contracture and amputation before the advent of antibiotics¹³. Complications such as joint stiffness, persistent infection, osteomyelitis or the need for amputation are more common in human bite infections and underline the importance of adequate debridement and appropriate antibiotics therapy¹⁴. The complication rates for bone, tendon sheath and joint infections (50%, 38% and 25%) are considerably higher than that for subcutaneous tissue infections (6%)¹⁴.

In general, the principles of managements of a hand infection are to give systemic antibiotics, elevate the limb and immobilize the hand in the position of function i.e. with the thumb and fingers semiflexed¹⁰. The choices of antibiotics depend on the likely source of infection. In view of common frequency of staphylococci, flucloxacillin, which is not inactivated by Penicillinase, is usually the first choice¹⁰. If Streptococcal infection is suspected on account of rapidly spreading lymphangitis large doses of benzyl-penicillin are given¹⁰. If rapid resolution does not occur, the antibiotic should be changed e.g. to erythromycin or a second generation cephalosporin (cefuroxime) and consideration should be given to drain the abscess¹⁰.

Several non-infectious conditions, some of which can be difficult to distinguish, can mimic a hand infection^{15,16}. Patients with chronic paronychias that are irresponsive to therapy should be checked for causes such as malignancy¹⁷.

PATIENTS AND METHODS

One hundred seventy six patients with hand infections

were studied from March 1, 2000 to March 1, 2003. This prospective study was carried out at CMH Peshawar, which is a tertiary care hospital. All the patients above twelve years were included in study except diabetics, immunocompromised patients, drug addicts and patients on steroid or cytotoxic therapy. Patients with crush or blast injuries, compound fractures, burns and skin lacerations, were also excluded from the study.

A data collection performa was devised for recording all the relevant information and findings of patients attending CMH Peshawar. Variables in this study were age, sex and occupation. In both males and females, the age groups were adolescents (13-19 yrs), young (20-39 yrs), middle(40-59 yrs) and elderly (60 & above). The groups of "Manual workers" and "Others", were made on the basis of occupation.

The diagnosis was based on patient's history and a physical & roentgenographic examination of the hand. All the patients were given Cloxacillin and Gentamycin in appropriate doses. The affected hand was elevated and functional position maintained. In case of suppuration, surgical drainage was done without any delay, which also confirmed the clinical diagnosis. The surgical drainage was done under tourniquet in general anesthesia. Pus was sent for culture and sensitivity. Antibiotics were changed accordingly. First dressing was changed after 24 hours and further dressings were done according to the condition of the hand. Early physiotherapy was instituted in all cases. Residual complications were assessed. The results were analyzed by calculating percentages, applying student t- test and chi- square test. Conclusions were drawn accordingly.

RESULTS

In our study the highest frequency was that of paronychia followed by ellulitis, felon, volar space infections, web space infections, thenar space abscess and mid palmar abscess (table-I). Majority of hand infections were observed in young age group followed by middle aged, adolescents and elderly patients (figure-1). Out of 176 cases, 114 patients were males and 62 were females; 126 were manual workers and 52 patients

included all others (figure-2 and figure-3).

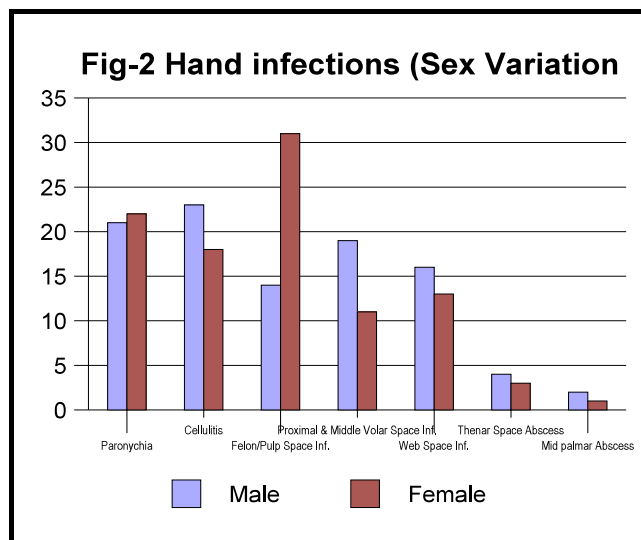
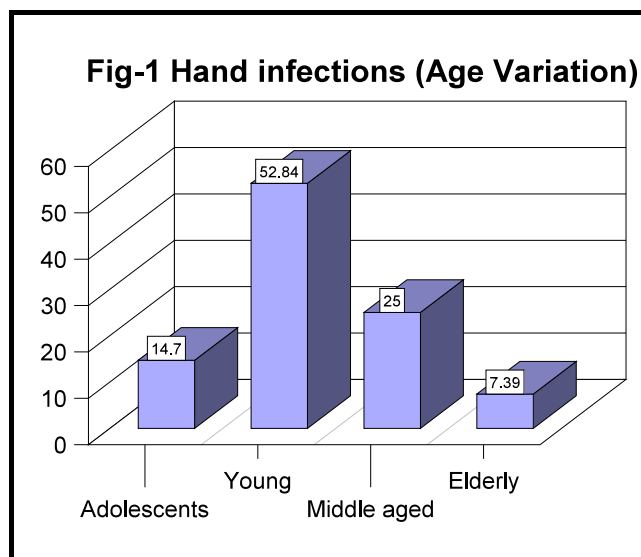
Type of Hand Infection	No. of Cases	Percentage
Paronychia	39	22.16%
Cellulitis	37	21.02%
Felon/Pulp Space Infection	34	19.32%
Volar space Infection	29	16.48%
Web Space Infection	26	14.77%
Thenar Space Abscess	7	3.41%
Mid Palmer Abscess	4	1.70%
Total	176	100%

Out of 176 cases of hand infections, single microorganism were detected in 98 cases (70.50%) while there was mixed growth of organisms in 34 cases (24.46%). Culture was negative in 7 cases (5.04%). Staphylococcus Aureus was the leading infecting organism. Percentages of other organisms are given in table-II.

Microorganisms	No. of Cases	%age
Staphylococcus Aureus	87	62.59%
Mixed Growth	34	24.46%
No Culture	7	5.04%
Beta-Hemolytic Streptococcus	5	3.60%
Non-Hemolytic Streptococcus	3	2.16%
E-Coli	1	0.72%
Pseudomonas	1	0.72%
Aerobacter Aerogens	1	0.72%
Total	139	100%

The most commonly observed complication was stiffness. The incidence of all the complications is

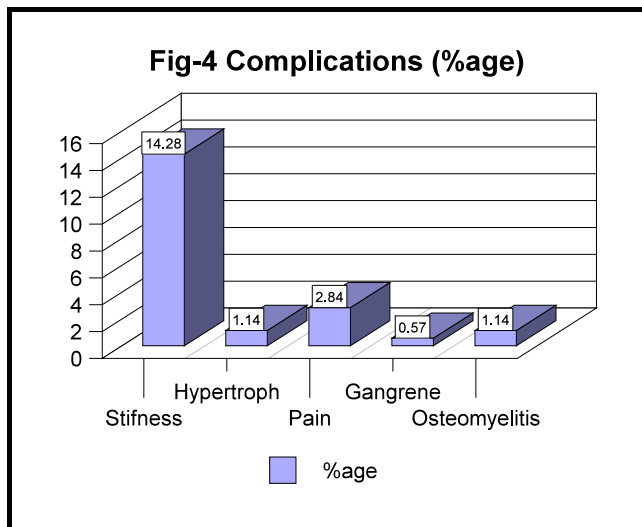
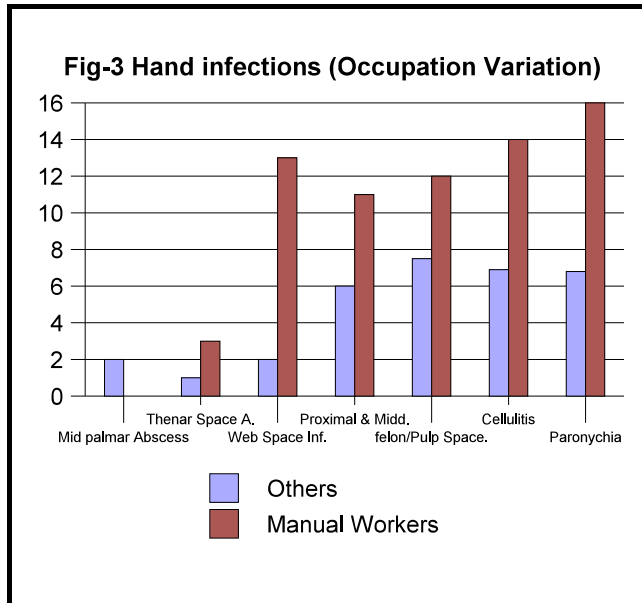
depicted in figure-IV. Maximum complication rate was noted in elderly patients (53.85%) followed by middle aged patients (27.27%). The complication rates for young patients and adolescents were 15.05% and 7.69% respectively. Out of 35 complicated cases 22 were males and 13 were females.



DISCUSSION

In our study frequencies of paronychia, cellulitis, felon, volar space infections (proximal & middle) and web space infections were 21.16%, 21.02%, 19.32%, 16.48% & 14.77% respectively.

However, in 1973, Nichols¹⁸ described the incidence of paronychia as 45%; Palmieri and Schwartz¹⁹, noted this as 36% and McConnell and Neale²⁰ described an incidence of 46% for cellulitis in 1979.



Felon was detected in 26% of cases by Palmieri and Schwartz¹⁹. The above-mentioned comparisons of paronychia, cellulitis and felon in different studies, reflect that frequencies of these hand infections are on decline. This decreasing trend is possibly because of increased health awareness and better management facilities

especially effective antibiotics. The frequencies of thenar space abscess and midpalmar abscess are 3.98% and 2.27% respectively. In 1982, Glass²¹ described the incidence of 21% for deep space abscesses. Stromberg²² showed a decreasing incidence of flexor tenosynovitis and dorsal hand infections between 1960 and 1980.

Hand infections are more common in manual workers than others (office workers etc). High frequency of patients in young age group is possibly because of the fact that most of the manual workers in army (soldiers), belong to this age group. Hence it is not the age but occupation (manual work) which puts them on high risk.

In our study, staphylococcus aureus was detected as sole causative organism in 62.59% cases. Stromberg²² detected S. aureus as sole causative organism in 87% of cases but only 34% of hand infections. Stern et al¹⁴ cultured S. aureus in 35% of hand infections. The decreasing frequency of S. aureus may be because of availability of better antibiotics against S. aureus. The relatively high frequency in our study may be attributed to untimely and inadequate treatment of hand infections in our country. In our study 3.6% cases were attributed to beta hemolytic streptococci while 17% cases of hand infections were cause by this microorganism in a study done by Eaton and Butsh²³. The relative low frequency in our study is offset by the fact that cases with mixed bacterial growth hand shown beta hemolytic streptococci in addition to other organisms. E-coli and Enterobacter aerogenes have 0.7% frequency for each in our study but it has been described as 5% and 11% respectively in a study done by Eaton and Butsh²³. Mixed growth was detected in 24.46% cases in our study. One fourth of the cultures grew out multiple organisms in a study done by Eaton and Butsh²³. Stern et al.¹⁴ described multiple organisms in 58.5% of cultures in 1983. A mixed flora was detected in 33% of the patients by Robson, Schmidt and Haggars²⁴. This review becomes important for choice of antibiotics to cover all these microorganisms even before the availability of C/S report.

In our study, residual complications occurred in 35%

cases out of 176 cases (19.89%). Stiffness was the leading complication followed by contracture. The hand must be diligently mobilized to avoid stiffness²⁵. Gender and complication are independent as calculated through chi-square test i.e. there is no significant difference amongst males and females as far as complications are concerned. Complication frequency was significantly high in elderly age group (53.85%). This finding is possibly because of the fact that immunological defenses in elderly patients are impaired due to malnutrition, atherosclerosis and defective blood supply.

CONCLUSIONS

- a. Generally hand infections have decreasing trend during the last three decades.
- b. Manual workers are significantly more prone for hand infections.
- c. Staphylococcus aureus is the most common infecting organism.
- d. Elderly patients are more prone for complications.
- e. Stiffness is the leading complication, which could be avoided through aggressive physiotherapy.

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