small hope of diminishing its incidence unless there is some major advance in prophylaxis or treatment, neither of which seems in prospect at present. Further advances in the control of non-gonococcal genital infection await the discovery of a causative organism or organisms, but this is proving a difficult task. It seems likely that modern methods of contraception, which provide no element of mechanical protection, favour the spread of gonorrhoea and non-gonococcal urethritis.

Complications of Cardiac Massage

Since W. B. Kouwenhoven and his colleagues\(^1\) evolved a simple method of external cardiac massage it has been increasingly used as emergency treatment in cases of sudden cardiac arrest. In a series they reported almost half (48%) of the patients thus treated were resuscitated and 25% survived.\(^2\)

Of the complications that may follow external cardiac massage the commonest is fracture of the ribs, seen in about a third of cases, the proportions varying from 28% to 50% in different series.\(^3\) Less common but more serious is injury to the spleen and adrenal glands.\(^4\) G. D. Lundberg and colleagues\(^5\) noted gastro-oesophageal tears and intestinal haemorrhage in 10% of 348 necropsies.

Now F. Paaske and his colleagues\(^6\) from the University Institute of Forensic Medicine in Copenhagen have made a four-year survey of 3,306 necropsy examinations which included 323 patients who had received external cardiac massage. Of the latter some 17% had to be excluded from further consideration owing to previous injury to the chest wall, leaving a total of 180 males and 88 females. In most instances massage was performed by a physician and in only 8% by an unqualified person, but there appeared to be no difference between the groups in the complication rate. Rib fractures were found at necropsy in 44%, increasing in frequency with age and bilateral in half the cases. There were sternal fractures in 22%, only in patients over 20 years of age, and minor cardiac lesions in the form of surface haemorrhages were seen in 16%. More serious complications were injury to the liver, in 2%, injuries to the spleen and adrenal gland, and the inferior vena cava, each in one case. Bone marrow emboli were noted only once. Other workers have found marrow emboli in some 10–20% of cases examined.\(^8\)\(^9\) C. T. Jackson\(^10\) found pulmonary fat embolism in 81% of cases, with 4 cases of cerebral fat embolism, but there was no correlation between its occurrence and fracture of ribs, so it may be accounted for by vigorous chest compression. Paaske and his colleagues’ conclusions were that 1% of cases showed serious complications which would have resulted in death.

The dangers of closed cardiac massage must be borne in mind, as they are inherent in the method. The pathologist doing the necropsy can help by drawing them to the attention of his colleagues, and he should also distinguish rib injuries from possible pre-existing trauma, otherwise a serious medico-legal error could occur. Experience in the U.S.A. suggests it is unlikely that a malpraxis suit would be successful against a physician employing this method of resuscitation.\(^11\)

Safer Smallpox Vaccines

In countries where smallpox is endemic the risks associated with vaccination are insignificant compared to the high morbidity and mortality of the disease. But in countries where the disease has been eradicated the case for routine vaccination has been questioned. In a recent report by C. H. Kempe\(^1\) we are reminded that in the United States the last death from smallpox to follow import of the disease occurred in 1948, but since that time there have been between 200 and 300 deaths from vaccination. Such data support those who advocate stopping routine vaccination and vaccinating only persons in an area surrounding an imported case. The weakness of this argument is that in these days of rapid travel much movement and contact may have taken place before the case is diagnosed. Moreover, if no improvements in the vaccines are made, the people vaccinated during an emergency will be exposed to the risk of complications. Furthermore, if this policy was pursued for several years, some primary vaccinations would be given to people in later life, when the risk of complication—especially of encephalitis—is greater than among young children.\(^2\) Clearly a more satisfactory approach would be to develop a safer vaccine. Such a vaccine is even more urgently required for eczematous children, who even if not vaccinated are at risk from accidental contamination with vaccinia from a vaccinated sibling or classmate. Indeed, several studies have shown that eczema vaccinatum is a much more serious disease in accidentally contaminated infants than in elective primary vaccination of those liable to eczema, in whom virus infection will only occasionally become generalized.

The present methods of manufacture of smallpox vaccine have changed little throughout the century. Lympf harvested from the inoculated skin of animals is made "safe" by killing pathogenic bacteria with phenol, but it is far from being bacteriologically sterile. Two major improvements must be made. The production methods must come into line with those applied to the more recent virus vaccines, and a more attenuated, though still protective, strain should be used. The report from Kempe\(^1\) is particularly pertinent here. Over the last 20 years he has been studying the reactogenicity and efficacy of a vaccinia virus which has been passaged 10 times in rabbit testicles, 49 times in chick embryonic tissue, and 19 times in chicken-egg chorioallantoic membranes. The virus harvested at the 78th passage


\(^3\) Kempe, C. H., Pediatrics, in press.

\(^4\) Kempe, C. H., unpublished data.