THE ROLE OF THE HUMAN APPENDIX IN IMMUNITY TO INFECTIONS

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In recent years the role of various lymphoid cells and organs in immunity has been clarified, notably that of lymphocytes and thymus. However that of the human appendix remains unclear. Structurally it is a reasonable candidate to have some role, but humans seem to exist satisfactorily without it. Animal work is not necessarily applicable to humans because the ontogenic development of lymphoid tissue, and its anatomical organisation and distribution vary extensively in different species and have in fact been used as a basis for phylogenetic classification. Most of the work on the appendix and immunity has been performed in rabbits, where the appendix is very different from that in humans. Some recent work has used foetal lambs (Lamm, 1976).

Gut-associated lymphoid tissue may be associated with bacterial infection, since gut bacteria are probably the earliest bacteria encountered (even "germ-free" animals encounter dead bacteria in their food); or it may be associated with the removal of mutated cells, since gut-lining cells are rapid dividers and so prone to mutation. One cannot perform removal experiments of gut-associated lymphoid tissue on newborn humans to answer these queries, but one can carry out a survey to try to relate the absence of an appendix to infection. To relate it to cellular immunity as opposed to humoral immunity would need an almost life-long survey since malignancy is a disease of age usually, and appendectomies are mostly performed by teenage.

Accordingly a survey was carried out on 478 pharmacy students from 1969 until the present. They had received lectures on humoral and cellular immunity, thus appreciating the purpose of the survey. They were asked to fill in a questionnaire, anonymously, stating whether they had had their appendices removed and if so age of removal; present age; infections before and after appendectomy if applicable; total infections if no appendectomy; if any infections were contracted abroad; if there was significant change of residence before and after appendectomy; sex. It was found impossible to obtain reliable information on vaccinations and tonsillectomies, so these were omitted from the analyses. It was assumed that all the appendices removed had on removal been found to have been requiring to be removed.

Results The replies were divided into students with appendices (435) and without (43); into male (203) and female (275); into U.K. (467) and foreign (11) Eighty types of infections were reported. Most expected childhood infections had occurred before appendectomy, and of those occurring 'after', only 1 was in a male. Only 5 appendectomies occurred before school-age - too small a group for reliability.

Considering total incidences, irrespective of sex or domicile, a few infections occurred more frequently in those with than without appendices. However two sex differences were noted: 11% males and 7% females were without appendices (normal frequencies for this country), and the mean ages of removal were 13 and 9 respectively (t-test showing 5% probability of such a difference occurring by chance). Present mean ages were 21 (males) and 20 (females). Therefore the replies were examined for differences on this basis. Females had a greater incidence of infections than males. There were no great differences in incidences between females with and without appendices whereas males with appendices had had a few infections more than those without.

Conclusion There may be a correlation between lack of antigenic stimulation of the appendix lymphoid cells or tissue and its subsequent overwhelming by infection. It may be more logical therefore to classify it as 'peripheral' not 'central' lymphoid tissue in the human. The lower incidence of childhood infections may account for the higher incidence of appendectomy in higher socio-economic groups.

Lamm, M.E. (1976). Advances in Immunology, 22, 223-290.

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