

Short Communication

Patho-Anatomical Findings in a Case of Mumps

With Pancreatitis, Myocarditis, Orchitis, Epididymitis and Seminal Vesiculitis

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Patho-anatomische Befunde bei einem Fall von Mumps

Mit Pankreatitis, Myokarditis, Orchitis, Epididymitis und Seminal Vesiculitis

Zusammenfassung. Bericht über die pathologisch-anatomischen Veränderungen bei einem 15jährigen Jungen, der an Mumps verstorben war. Als Komplikation wurden Pankreatitis, Myokarditis, unilaterale Orchitis, Epididymitis und Vesiculitis beobachtet.

Summary. A report is given of the patho-anatomical findings in a 15 year old boy who died from mumps complicated by pancreatitis, myocarditis, unilateral orchitis, epididymitis and seminal vesiculitis.

Very little is known of the morphological changes associated with mumps or epidemic parotitis (e.p.). This is not remarkable since it is an infectious disease with an almost invariably good prognosis. It is fatal in less than 1 per 1,000 cases (CECIL and LOEB). In the investigation of the pathological changes in e.p. information is largely gained from experimentally induced disease in animals (ANDERSON). Fatal cases reported in the literature have usually occurred some time after the onset of the disease (BROUSTET et al.; ROBERTS and FOX; HUGHES et al.). The postmortem changes seen in various organs in these cases have been of sub-chronic or chronic nature. Moreover, the interest at such examinations has been focused mainly on the fatal complications, with the result that other findings have been incompletely described. Descriptions of the autopsy findings of subjects who have died in the acute stage of e.p. are therefore rare (MANCA).

The findings made at postmortem examination of a fatal case of e.p. are given below.

Report of a Case

A 15-year old boy, who had felt well, developed e.p. on January 5, 1967. He remained in bed at home for 5 days. He was anorexic and had vomited. On January 10 his temperature rose to 41° C and a doctor was consulted who prescribed a salicylic acid preparation and further bedrest. During the following few days the boy's general condition improved, his temperature fell, but he still had no appetite. In the morning of January 14 the patient was afebrile. At mid-day after having been to the toilet, he suddenly developed respiratory distress and became unconscious. He was immediately transferred to hospital, but died on the way. The doctor who had treated him reported that the clinical picture was that of a normal e.p. except for the patient's anorexia.

Autopsy was done about 44 hours after death.

Gross Examination

The body was well-developed (length 162 cm, weight 59 kg) with an average amount of fat and muscular tissue. There were no signs of peripheral oedema. The *heart* (weight 460 g) was dilated. Scattered petechiae were seen beneath the epicardium. The endocardium, valves and orifices were normal. The coronary arteries showed nothing abnormal. The myocardium was strikingly pale and flaccid. The *spleen* (weight 415 g) showed signs of acute splenitis. The *liver* (weight 1415 g) showed signs of congestion. The *trachea* and *bronchi* contained abundant foamy mucus. The mucosa was slightly reddened. The lungs (right 390 g and left 290 g) were congested and moderately oedematous. The *kidneys* (total weight 315 g) were congested. The ureters were normal. The *adrenals* were of normal size; the lipoid content of the cortex was decreased. The *hypophysis*, *thyroid* and *thymus* were of normal appearance. The *brain* (weight 1160 g) was slightly oedematous, but otherwise of normal appearance, as were the meninges and the basal cerebral arteries.

Both *parotid glands* were moderately enlarged, swollen and moderately firm. The surrounding tissue was moderately swollen. The submandibular glands were slightly swollen and felt slightly firmer than normal. The sublingual glands appeared normal. The *pancreas* was unremarkable. Enlarged, soft *lymph nodes* with a grey-red cut surface were found at both mandibular angles. The right half of the scrotum was severely enlarged. The scrotal skin was markedly swollen and reddened with punctate haemorrhages. The tunica albuginea of the right *testis* was thickened, swollen, and haemorrhagically discoloured. The testis was difficult to remove from the scrotum. The right testis was double the size of the left, was swollen firm and haemorrhagically discoloured due to capsular bleeding. The cut surface of the tissue showed haemorrhage and an abundant amount of haemorrhagically discoloured watery fluid oozed from its surface. The right epididymis was twice as large as the left, was swollen and bluish-red. The left testis and epididymis were normal. The seminal vesicles and the prostate were of normal appearance.

Microscopic Examination

Specimens from most of the organs were fixed in 10% formalin, Bouin's fixative, embedded in paraffin and stained with haematoxylin-eosin, iron haematoxylin-eosin, Periodic-acid Schiffs reagent, and Mallory's PTAH-staining. Sections of the heart were stained for elastic tissue by VAN GIESON's method. Sections of the lungs were examined for iron pigment with TURNBULL's reaction. Frozen sections were stained with Scharlach Rot. *The parotid, submandibular and sub-lingual glands, and the pancreas:* The large salivary glands revealed inflammatory changes in the interstitial tissue, in the lobules, and in the excretory ducts (Fig. 1). The changes were scattered irregularly and of varying severity. There was massive interstitial oedema with marked widening of the connective tissue septa which contained numerous lymphocytes and histiocytes. The epithelial cells lining the excretory ducts were hyperchromatic and their nuclei pyknotic. The lumina contained desquamated epithelium, polymorphonuclear leucocytes and lymphocytes. Some of the excretory ducts were dilated, lined by low epithelium, whereas the lumina of others were narrowed by swollen epithelium. Both normal and changed excretory ducts were seen together in the same area. Some of the excretory ducts were enclosed by a broad band of lymphocytes, but the epithelium that lined the ducts was intact. In other ducts the epithelium showed hyperchromasia and necrosis of the nuclei with little or no inflammatory cell reaction in the surrounding connective tissue. Inflammatory changes were observed mainly around small and medium-sized excretory ducts. Streaks of inflammatory cells threaded their way between glandular tubules and compressed the tubules. Some of the tubules showed pyknotic nuclei and necrotic epithelium. The capsule, like the surrounding tissue, was hyperaemic, oedematous and contained inflammatory cells, mainly lymphocytes. The changes were striking in the parotid glands, moderate in the submandibular glands and mild in the sublingual gland. The pancreas showed mild interstitial inflammation with a few scattered lymphocytes and an occasional polymorphonuclear leucocyte.

Internal Genital Organs. The right testis was markedly changed (Fig. 2). It was very hyperaemic and oedematous. Its interstitial tissue, capsule and surrounding fat and connective tissue showed inflammatory cells and haemorrhage. Fibrin was found in some areas

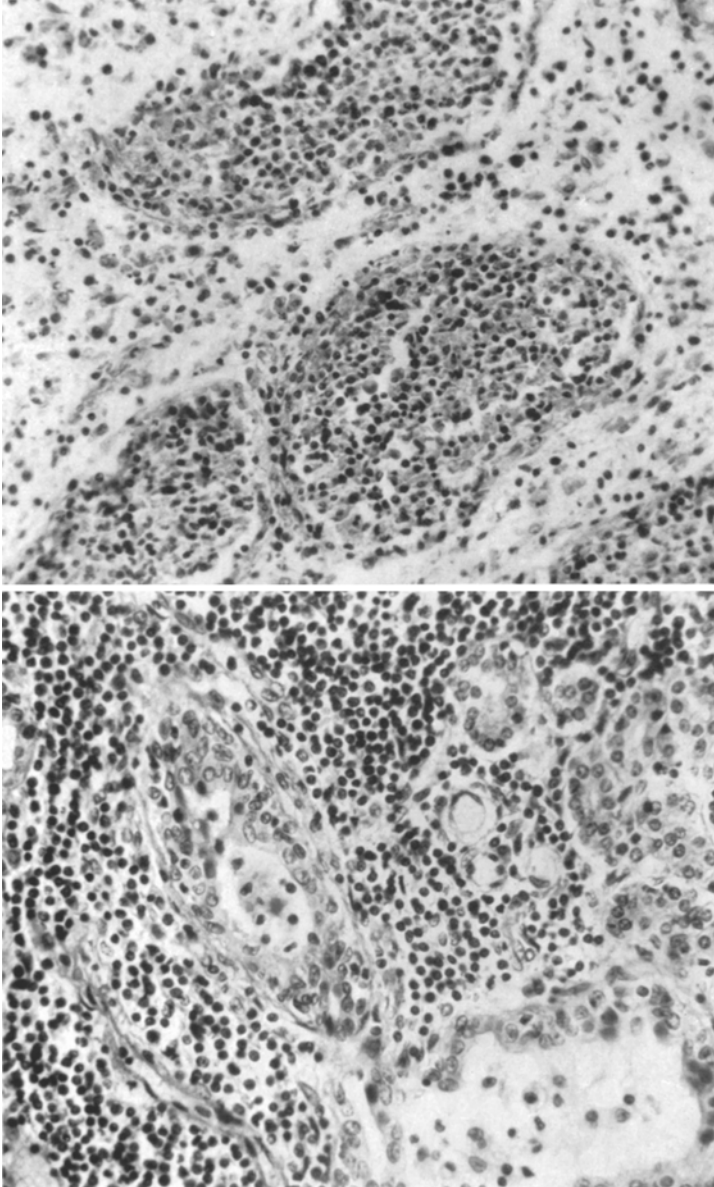


Fig. 2

Fig. 1

Fig. 1. Small and medium-sized excretory ducts of the parotid gland are enclosed by a broad zone of inflammatory cells, mainly lymphocytes, which also infiltrate the glandular acini. The epithelium of the excretory ducts shows nuclear pyknosis and necrosis. The lumina contain exudate with desquamated epithelium and inflammatory cells. Hematoxylin-eosin $230\times$

Fig. 2. The right testis is markedly oedematous and contains abundant inflammatory cells. The tubules are separated and filled with necrotic epithelium and inflammatory cells. Hematoxylin-eosin, $210\times$

around the capsule and in the surrounding tissue. The interstitial tissue was increased in breadth and the tubuli were unusually widely spaced. The inflammatory cells consisted of lymphocytes, polymorphonuclear leucocytes, plasma cells and histiocytes. Leydig cells

showed hyperchromasia and pyknosis of the nuclei and the cytoplasm was stained dark with eosin. Most of the tubules were necrotic and filled with a variegated carpet of lymphocytes, plasma cells, polymorphonuclear leucocytes, histiocytes and necrotic epithelial cell elements.

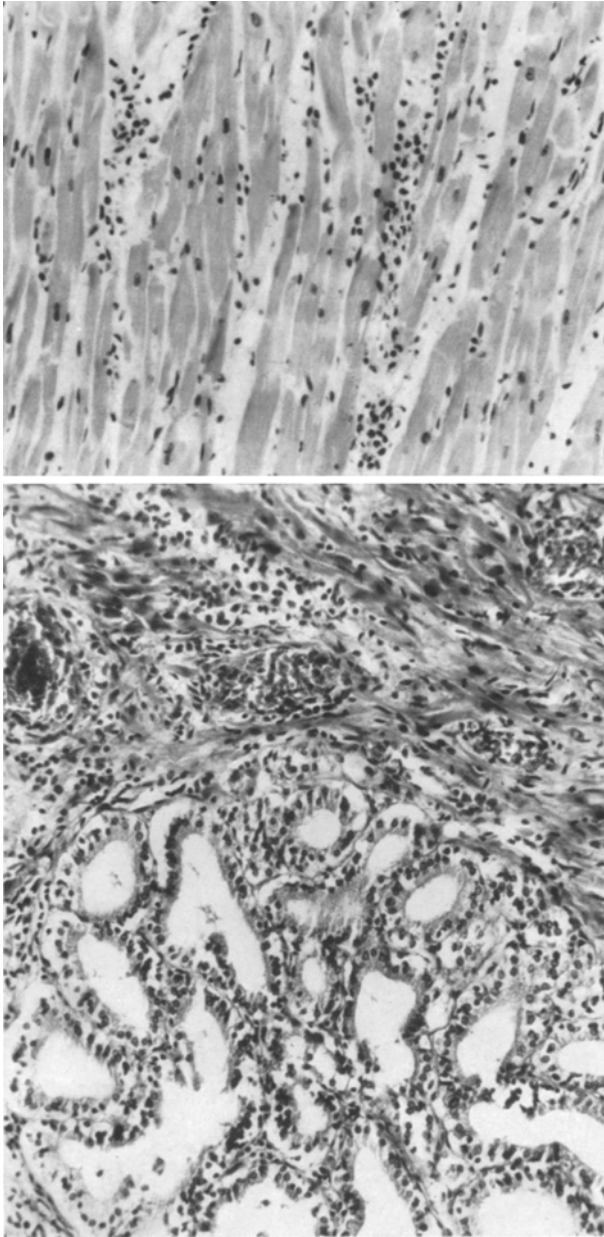


Fig. 3

Fig. 3. Inflammatory cells in the mucosa and fibromuscular tissue of the right seminal vesicle. Hematoxylin-eosin, 250 ×

Fig. 4

Fig. 4. Mild oedema and streaks of lymphocytes, plasma cells, polymorphonuclear leucocytes and histiocytes between myocardial fibres. Hematoxylin-eosin, 250 ×

The walls of several tubules were split and the tubular structure was no longer recognizable. A few tubules were better preserved. They were full of densely crowded cells where different types of spermatogenic cells intermingled with inflammatory cells. Sertoli cells and sper-

matogonia were better preserved, while destruction affected mainly the spermatocytes and spermatids. No mitotic figures were found. A few sperms were seen.

The right epididymis showed signs of severe interstitial hyperaemia, oedema and deposits of inflammatory cells of the same appearance as those in the testis. The epithelium of the excretory ducts was degenerated and necrotic. The excretory ducts contained many inflammatory cells, degenerated and necrotic epithelial cell elements, rests of cytoplasm, abnormal spermds with multinuclear giant cells and sperms of normal appearance.

The left testis showed slight changes in the tubules. The picture was characterised by an increased desquamation of spermatogenetic cells. Some spermds showed nuclear pyknosis and some were multinuclear. The spermatocytes, and to a less extent the spermatogones showed hyperchromasia of the nuclei, pyknosis, karyolysis, abnormal mitotic figures and giant

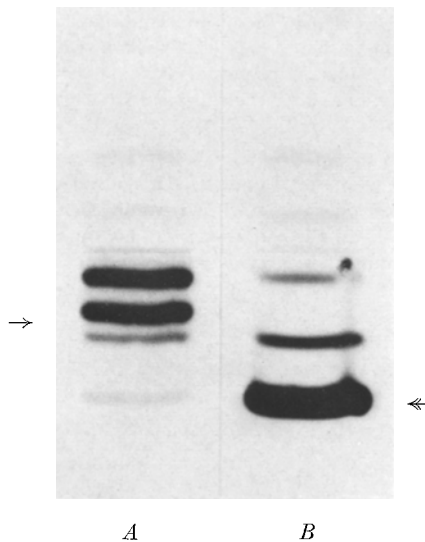


Fig. 5. LDH-isoenzyme in homogenate of testis. The left (*A*) uninflamed testis contains isoenzyme X (→) but not the inflamed right (*B*) one which instead has abundant isoenzyme V (←)

cell formation as well as eosinophilia of the cytoplasm. The sperms were of normal appearance. The interstitial tissue appeared normal.

The left epididymis was essentially normal. The lumina of the excretory ducts contained degenerated spermatogenetic cells, cytoplasmic bodies, multinuclear giant cells and sperms of normal appearance. There was no inflammatory cell reaction. The interstitial tissue appeared normal.

The mucosa and fibromuscular tissue (Fig. 3) of the right seminal vesicle contained moderate numbers of lymphocytes and polymorphonuclear leucocytes. The surrounding fat and connective tissue was slightly oedematous and contained a few inflammatory cells. The left seminal vesicle was normal. The prostate gland contained a few interstitial round cell infiltrates.

Smears of secretion from the right and left ampulla ductus deferentis showed a similar picture. The sperms appeared normal. There was no increase in the number of sperms with abnormal heads or cytoplasm. Neither was there any increase in the number of sperm precursors, cytoplasmic bodies or inflammatory cells.

Myocardium. Some areas showed interstitial oedema with separation of the muscle fibres. No fibrin was found. Between the muscle fibres, sparse streaks and groups of lymphocytes, neutrophilic leucocytes, plasma cells and histiocytes were seen (Fig. 4). In some areas

muscle fibres tended to be fragmented with decreased staining reactions. The striation of the muscle fibres was preserved. The inflammatory changes were seen in both the deep and superficial layers of the muscle adjacent to the endocardium which was uninvolved. The vessels were dilated and filled with blood. The vessel walls were of normal appearance. No granulomata or fibrinoid necroses were seen. The cytoplasm of the muscle fibres showed no increase in fat. The changes were most pronounced in the wall of the left ventricle, but were seen also in other parts of the myocardium.

Respiratory Tract. The mucosa of the trachea and bronchi was hyperaemic and contained lymphocytes and polymorphonuclear leucocytes. In the upper airways, including the nasal cavities and the accessory sinuses, the mucosa appeared normal without inflammation. No inclusion bodies were seen. The lungs were congested and oedematous. The alveoli contained scattered phagocytes with digested iron pigment.

Other Organs. The spleen was rich in blood and contained an increased numbers of polymorphonuclear leucocytes in the pulp and sinuses. The liver was acutely congested with small necrotic foci around the small veins. The lymph nodes at the mandibular angles showed a non-specific inflammatory reaction. In other organs the histological picture verified the gross findings.

Other Examinations. Homogenates of the testes were examined for LDH-isoenzyme (Ann Voigt, Dept. of Clinical Chemistry, Lund). LDH was separated in isoenzyme by electrophoresis on agar-gel. Afterstaining was done with Nitroblue-tetrazolium according to VAN DER HELM. Isoenzyme X was found in the left testis but not in the inflamed right one, which instead contained a large amount of isoenzyme V (Fig. 5).

Discussion

Epidemic parotitis, as the name indicates, is an infectious disease of the parotid glands. It should be stressed, however, that, as in the present case, the submandibular and sublingual glands may also be involved.

Opinion differs as to the primary site of the inflammatory changes in the salivary glands, i.e. whether it is primarily an inflammation of the ductal system, the acinar glands or the interstitial tissue (LANG). This divergence of opinion arises from various factors. Firstly, most authors base their opinions on single cases. Secondly, they have made their observations at different stages of the disease. The differences between the findings in various cases may, therefore, be ascribed in part to differences in the stages of the pathological changes. In the present case, inflammation primarily in the ductal system appears most likely. Changes in the glandular acini probably was secondary to the interstitial and ductal inflammation.

In the present case there was inflammation of the right testis, epididymis and seminal vesicle. The inflammation of the seminal vesicle may be conceived as a component of the involvement of the large salivary glands and pancreas, or as a stage in the inflammation of the testis and epididymis. The multiglandular involvement in this case was, however, striking and underlines the systemic nature of e.p. Inflammation of the seminal vesicle has, as far as is known, not been described previously in e.p.

Orchitis is said to occur in about 20% of all cases of e.p. (CECIL and LOEB). It is generally unilateral and usually appears when the inflammation of the salivary glands has begun to subside. The testicle may swell to twice or three times its normal size. The histological picture is characterised by interstitial and tubular inflammation. Some tubules become necrotic, while others are better

preserved. The inflammation often leads to fibrosis of the testis. The picture in this case was similar to that described previously in e.p. Although the inflammation involved the right testis, it should be stressed, that the left testicle also showed pathologic changes. In this testis there were degenerative but not inflammatory lesions.

LDH-isoenzyme X is specific of mature sperms (BLANCO and ZINKHAM). On examination of testicular homogenate for LDH-isoenzyme, isoenzyme X was found in the left uninflamed testicle but not in the right inflamed one. On microscopic examination normal sperms were found in usual numbers in the left testis but barely any in the right testis. The right testis contained relatively large amounts of isoenzyme V which could be explained by the massive leucocytic infiltration.

Epididymitis in e.p. has received less attention in the literature than orchitis, but is sometimes said to be as common as orchitis (NORDLANDER; CORAN and PERLMUTTER; LYON and BRUYN). Epididymitis like orchitis occurs most often in young adults. The inflammation in this case was essentially similar to that in the testis.

Relatively few morphological descriptions of myocardial changes in e.p. in human beings are available. Of the published deaths from myocarditis in e.p. one occurred soon after the onset of the disease (MANCA), whereas in the other cases there was a longer interval between the onset of myocarditis and death (BROUSTET et al.; ROBERTS and FOX). In the acute stage the myocardium resembles boiled meat (MANCA). The microscopic picture is characterised by serous and cellular exudation of polymorphonuclear leucocytes, lymphocytes and fibroblasts. The muscle fibres are degenerated. In the subchronic and chronic stages there are signs of repair with fibrosis. An essential subendocardial fibrinous reaction has been described and thickening of the endocardium in the left ventricle. The present case was characterised microscopically by interfibrillar oedema with inflammatory cell infiltrates and mild degenerative changes of the muscle fibres. The changes involved the entire myocardium but were most pronounced in the wall of the left ventricle. There was no predilection for the subendocardium and the fibrinous component was scanty. The endocardium was intact.

Although e.p., even when generalised with manifest complications, usually runs a favourable course, it may, as illustrated by the present case, occasionally be fatal.

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