A CASE OF GUMMA OF THE HEART.

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THE case from which this specimen was taken was that of a male, A. D., aged thirty-six, plumber, who died quite suddenly in April last. As he was not under medical observation, there is no clinical history. I owe the specimen to the kindness of the City Coroner, Mr. L. A. Byrne, and of Dr. M. Maughan, who performed the autopsy. At the inquest it was deposed that deceased had complained of headache on several occasions before his death, but was able to attend to his business. On the day of his death he went to his work as usual, but returned to his lodging in the early afternoon, stating that he had "finished his job." He sat down on his bed and lit his pipe. Shortly afterwards he called out and lay down on the bed. He could not be aroused, and life was pronounced to be extinct by the doctor who was at once called in. The man was a widower, and no information is available as to whether he had had any children. The notes of the autopsy contain nothing of importance save the condition of the heart.

The heart is of average size, and shows pronounced fatty infiltration of its anterior surface. There is no valvular lesion, and but little atheroma of the aorta. The wall of the left ventricle and the septum are extensively infiltrated with a whitish new growth of firm, fleshy consistence. The infiltration is most marked at the base,

and extends about two-thirds of the way towards the apex. The lower part "tails" off into discrete white nodules about the size of a pea. These have a pronouncedly sarcomatous aspect. In the middle of each, however, is seen a small, reddish spot or area which is suggestive of an obliterated blood-vessel, or, perhaps, of an area of hæmorrhagic necrosis.

At the base the wall of the left ventricle measures as much as an inch (2.5 cm.) in thickness, and is almost entirely composed of neoplastic material, the muscle fibres being to a large extent replaced by it. The septum is also infiltrated to a remarkable degree, measuring four-fifths of an inch (2 cm.) in thickness, about an inch below the aortic valve. In this situation the growth presents with remarkable distinctness the appearance of being composed of a number of discrete nodules, each of which has a reddish area at its centre.

A neoplastic mass consisting of two of these nodules, and as big as a hazel nut kernel, fungated through the septum and projected into the right ventricle at point of attachment of one of the ligaments of the tricuspid valve.

The question naturally presents itself as to whether this new growth was so situated as to interfere with the conducting system of the heart. There can be no doubt that such was the case. It extended up the septum to the pars membranacea, and attachment of the aortic and mitral cusps, and must necessarily have interfered with the bundle of His. Higher up, however, the region of the sino-auricular node was free. The auricles had, in fact, escaped infiltration.

On microscopic examination the new growth proved to be of syphilitic origin.

For two reasons I consider it desirable to give a some-

what minute description of the microscopic appearances. First, because of the comparative rarity of gumma of the heart—this is the only specimen I have seen out of several hundreds of autopsies which I have performed; and secondly, because in this case the neoplastic or formative element distinctly predominates over the necrotic or degenerative, and we are thus enabled to obtain an insight into the earlier stages of gumma-formation. Now, the earlier proliferative stages of a gumma are relatively unfamiliar to us, as compared, for example, with those of a tubercle. Tertiary syphilitic lesions are rare as compared with those of tubercle, and, moreover, cannot, at any rate, so far as I am aware, have not, been produced experimentally, whereas nothing is easier than to produce experimental tubercle. These considerations seem to justify a somewhat detailed account of the minute structure of this specimen.

The new growth consisted mainly of mononuclear cells, polynuclear being conspicuous by their absence. The following varieties of cells were present :—

1. Small round cells with deeply-staining nucleus surrounded by a narrow fringe of protoplasm—lymphocytes.

2. Plasma cells—in other words, rounded or more often oval cells, with abundant protoplasm, and a nucleus which is often eccentric in position, and presents a number of very distinct chromatin-masses often arranged like the spokes of a wheel.

3. Larger round cells with pale-staining oval nucleus—the so-called epithelioid cells.

4. Eosinophiles of mononuclear type.

5. Fibroblasts—still larger cells with oblong, pale-staining nucleus and protoplasm often fibrillated at the periphery. Many of them possessed more than one

nucleus. These nuclei showed all stages of thinning out till they became merely rod-shaped—the nuclei of a connective tissue bundle.

6. Giant cells.—These were quite numerous as compared with those met with in tubercle; they were on an average smaller. Their nuclei were fewer, but were mostly at the periphery, like those of tubercle. Their protoplasm seemed more basophilic than that of the tubercle giant cells, and another point of distinction was, that they were not surrounded by definite epithelioid areas, but were scattered any how through that part of the fibroblastic granulation tissue which abutted on the area of necrosis.

As regards the representation of each of these varieties, the small mononuclear or lymphocyte was undoubtedly the commonest. It was, moreover, the earliest to appear if one may judge by the fact that the periphery of the nodules when the growth was extending among the still intact muscle fibres, the first change seen was the appearance of groups of lymphocytes which seemed to push the muscle fibres aside and press upon them, thus causing them to grow thinner, and ultimately to disappear. During the process of atrophy, enormous numbers of plasma cells make their appearance apparently as a developmental stage of the lymphocytes. Nowhere have I seen such swarms of this variety of cells. The plasma cells were in some places intimately mixed up with the fibrils of the disintegrating muscle, and seemed to be active agents in its distinction—though not, so far as I could see, by way of phagocytosis. What their ultimate fate is I cannot say. I did not observe any intermediate stages between them and fibro-blasts. Towards the area of degeneration the plasma cells became loosened, as it

were, from their surroundings, swollen and vacuolated, after which they underwent fatty degeneration, the nucleus became fragmented and the cells disintegrated.

In other parts of the granuloma the epithelioid and fibroblastic elements predominated. The giant cells were, as I have said, scattered in moderate numbers through these areas, and appeared to be derived from rounded or oval cells of epithelioid type. One could make out here and there bundles of oval nuclei embedded in a scanty protoplasm. These seemed to be an early stage in the development of the giant cells. Other cells were seen with similar nuclei, more evenly scattered through a more abundant protoplasm, whilst others, larger still, had their nuclei at the periphery.

If these appearances were not due to artefacto—and, so far as I could judge by following them through consecutive sections of a paraffin series they were not of that nature—the development of the giant cells in this granuloma would appear to take place in the following satges :—

(1.) Multiplication of the nucleus of a mononuclear or young fibro-blastic cell—a polyblast.

(2.) Swelling up or increase of its cytoplasm.

(3.) Assumption by the nuclei of a peripheral position in the now basophilic protoplasm.

With regard to the method of nuclear multiplication I can only say that I saw no indication of mitosis, and am clearly of opinion that it must have taken place by a process of direct division (amitosis) somewhat allied to sprouting. This I consider to be also the case with tubercular and foreign-body-giant-cells.

With regard to the nourishment of the newly-formed fibroid tissue, one could make out capillaries of new formation running through it, and composed of a single

layer of angioblastic cells. As compared with those of ordinary wound-granulations, they were very few and far between. They seemed to undergo obliteration at an early stage.

This leads me to the description of the changes undergone by the pre-existing blood-vessels of the cardiac tissue. Many of them—both arteries and veins—presented in its most typical form the intimal proliferation so characteristic of syphilitic disease.

From the internal elastic lamina inwards there extended a layer of newly-formed fibroblastic tissue pushing in or replacing the true intima, and so filling up the lumen completely or leaving only one or more slit-like channels open. In many of the minuter arterioles the newly-formed fibroblastic cells were lying loose in the lumen, and appeared to be derived from proliferation of the endothelium. They were often twisted together in a curious rope-like way, and their nuclei were arranged cross-wise to the lumen. In the larger arterioles, and of about a millimetre diameter, newly-formed capillaries could be distinctly seen penetrating from without into the granulation tissue with which the lumen was filled. The smaller veins were affected like the arteries. The new growth was not in all cases symmetrically disposed round the interior of the vessel, but projected in an irregular manner occasionally.

With regard to the necrosis, it took the form of patchy areas, which often had for their centre an obliterated and necrotic artery. Traces of cellular structure and of elastic tissue could be distinctly made out.

Lastly, with regard to the plasma of the specific micro-organism, to the presence of which (or of its products) these extensive neoplastic and degenerative processes must

be ascribed, I have had several blocks of tissue worked up by Levaditi's method, and have examined sections, but so far with negative results. It is, I believe, generally agreed that the spirochæte is rare in gummata.

I may conclude by summing up the reasons why, in the absence of the specific disease-producing agent, I have regarded this granuloma as of syphilitic (rather than, for example, tubercular) origin.

1. Tubercle rarely, if ever, produces large granulomata in the heart, whereas this is often the case with syphilis.

2. Cells of so-called "epithelioid" type are numerous and prominent in tubercle, whereas in this growth they were quite inconspicuous as compared with lymphocytes and plasma cells, which are well known to be characteristic of gumma.

3. This growth consists to a large extent of a low type of fibrous tissue, which is nourished by newly-formed vessels—this is not the case with tubercle.

4. The alterations in the walls of the pre-existing vessels and the peri-arterial distribution of the new growth are in the highest degree characteristic of syphilis.

Dr. Boxwell said with regard to the rarity of gumma of the heart it would be remembered by members of the Section that he had shown a specimen of the condition last Session and another in the previous year. In both cases the condition caused sudden death. The appearance of one of the specimens shown by him was extremely like the one now exhibited, except that the plasma cells were less obvious, and the gumma suppurated and had become infected and was discharging pus into the left ventricle. Dr. W. G. Harvey had shown a large solitary tubercle of the ventricle at the same meeting in the case of a child aged twelve years.

Dr. O'Farrell referred to the relative numbers of tubercular giant cells and tubercle bacilli, and suggested that the same inverse proportion might hold good in the case of syphilitic giant cells and treponemata. He thought the basophilic cytoplasm of the syphilitic giant cell was characteristic.

Professor McWeeney, in replying, said that when he referred to the rarity of the specimen he was only referring to his own experience. He understood that on the other side of the Channel the condition was by no means rare. Referring to Dr. O'Farrell's remarks he said that it struck him as extraordinary that there should be so much structural change in the practically complete absence of syphilitic organisms. It might be said that it was the products of the organism that were doing the mischief, but how could its products be there if the organism was not there itself?