

## TIETZE'S DISEASE (NON-SUPPURATIVE NON-SPECIFIC SWELLINGS OF RIB CARTILAGE)

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In 1921 Tietze described 4 patients aged from 28 to 50, 3 females and 1 male, who all showed the same clinical picture—viz., swellings of costal cartilages of insidious onset associated with little or no constitutional disturbance, spontaneously painful, and with a prolonged course characterized by fluctuations in the size and tenderness of the swellings. Though one case was followed for over a year, no signs of suppuration developed. The lesions were firm and were confined to the cartilages, which appeared to be expanded locally. The skin over them was normal and freely movable. In one case the intercostal space was filled by the mass. In two patients, aged 42 and 50, radiographs showed calcification of the cartilage, but this may have been coincidental.

In reporting these cases Tietze stressed his ignorance of their nature and the fact that, although he had encountered them all in a short space of time, he had not previously seen a similar condition and could find no reference to earlier descriptions of such cases. Following Tietze's paper, Harttung (1923) described a very similar case which he also had seen in 1921. Radiographs disclosed no changes, but biopsy of part of the diseased cartilage revealed calcification and fibrosis. He referred also to another case reported in 1921 at the Medical Society of Breslau by Froehlich, in which four rib cartilages were involved and which had developed during the course of one year. At the same meeting Kuettner, in the discussion on this case, mentioned several similar cases, in one of which biopsy showed small nodules consisting of fibroblasts and many giant cells.

No further references have been found in the literature since that time, except for a paper by two Japanese authors, Satani and Fujii (1937), who reported 9 cases of Tietze's disease occurring in under-nourished women. Radiographs showed in one case atrophy of the rib cartilage, and in another shortening of the rib and calcification of the cartilage; in all other cases radiology revealed no abnormality. Biopsy in these cases revealed fibrosis, ossification, and atrophy, there being neither granulation tissue nor pus.

During the last few months we have observed 5 young soldiers showing the syndrome described by Tietze, and owing to its rarity we have considered these cases worthy of record. That this condition should have been encountered so frequently in such a short period indicates that at present it is no longer so rare as the scarcity of references suggests. Personal communications tend to support this contention and confirm its former rarity.

### Case Reports

*Case 1. Aged 27.*—Six days before admission the patient had noticed a tender swelling in the left upper chest, followed three days later by malaise, shivering, fever, cough, and pain in the left chest. Previous health good. On admission: temperature 102°; signs of bronchopneumonia at both bases. There was a visible swelling of the second left costal cartilage at the costo-chondral junction. This was of firm elastic consistency, and arose from the second cartilage, but its upper limits were ill-defined and extended upwards to become continuous with the first costal cartilage. It was tender on pressure, but not spontaneously painful. The overlying skin was normal. Radiographs showed no abnormality. With treatment, including sulphapyridine, the bronchopneumonia resolved, but the lump, though less tender and slightly smaller, remained four weeks after the onset. However, when last seen, some four weeks later, there remained only a slight thickening of the

costo-chondral junction and there was no tenderness. *Investigations:* Blood W.R., negative; white cell count and differential, normal; B.S.R., normal; sputum, nothing significant; Widal, negative.

*Case 2. Aged 24.*—Admitted complaining of cough and pain in the left chest, the latter of two weeks' duration. A comrade had called his attention to a lump in the left upper chest at the time of onset of the pain. On admission he was afebrile, and presented the signs of chronic bronchitis and emphysema. A swelling was visible at the second left costo-chondral junction—firm, smooth, and tender on pressure. Spontaneous pain was not present. The overlying skin was normal. Three weeks later, when last seen, the lump was smaller and was no longer tender. *Investigations:* No material could be obtained on needling; culture, sterile; radiograph, negative; Widal, negative; white cell count and differential, normal; B.S.R., normal; sputum, pneumococci predominant; blood W.R., negative.

*Case 3. Aged 21.*—Developed bronchitis following appendectomy, and, five days later, pain in the left chest. Temperature 99°. Six days after this he noticed a swelling of the chest, and on examination there was a visible prominence in the region of the seventh rib cartilage, extending about 2 in. along the costal margin and involving the sixth and eighth cartilages. The swelling was hard, and was confined to the cartilages, the intercostal spaces being normal. On discharge some three weeks later the tenderness had gone, but the swelling was still present. As in the previous cases, all investigations were negative.

*Case 4. Aged 29.*—He had noticed, ten days after pneumonia, a painful tender swelling in the right upper chest. This to a large extent subsided during the next two months, but a month later, following a common cold, it reappeared, and on admission to hospital a diffuse, smooth, firm, tender, ill-defined swelling was visible and palpable in the right upper chest, involving the first, second, and third costal cartilages and filling up the intercostal spaces. Laterally it extended to the anterior axillary line. The overlying skin was normal. There was no fever. This patient has been observed over a total period of nine months, during which time the pain and tenderness, and the size of the swelling, have altered only slightly, the condition remaining substantially unchanged to date. Occasionally there has been fever up to 99°. *Investigations:* B.S.R., 8 mm. in 1 hr. (Westergren); white cell count, normal; blood W.R., negative; Widal, negative; blood calcium, normal; radiographs showed soft-tissue shadow in the region of the swelling, but no bony abnormality; needle exploration, negative.

*Biopsy of Case 4 (Mr. John E. Rowlands).*—At operation an incision was made directly over the third right costal cartilage extending 4 in. laterally from the edge of the sternum. There was a spindle-shaped enlargement of the cartilage. The intercostal spaces above and below were encroached upon by this swelling, but were clearly definable from it. The tissue of the spaces was oedematous and abnormally vascular, but was not infiltrated by the tumour. The swelling was incised and a wedge-shaped piece removed. It had the appearance of normal cartilage.

*Histology of Case 4 (Dr. A. M. Barrett).*—The section showed an unmistakable resemblance to cartilage, the cells being enclosed in spaces in the typical cartilaginous matrix. Along one border (apparently the periphery of the nodule) the cells were flattened and small, and at the extreme edge here the appearance of the tissue approached that of collagenic fibrous tissue; elsewhere in the section the cells were for the most part much larger, and the matrix stained more deeply with haematoxylin. Here, too, the cells were not arranged so regularly in pairs, groups of 6 to 8 cells being frequent. A few rather wide blood spaces and more abundant smaller ones were present; also areas (apparently corresponding to the opaque streaks seen with the naked eye) having a fibrillar structure, and as the fibres stained deep red with van Gieson's stain they were presumably collagen fibres. There was no evidence of inflammation.

*Conclusion.*—The nodule was composed of cartilage, and on histological grounds alone it would be difficult to say that it was not a piece of normal costal cartilage. However, it would do equally well for a chondroma.

*Case 5. Aged 19.*—Developed rheumatic fever with pneumonia following tonsillectomy, and seven weeks later complained of pain in the second right costo-chondral junction, examination of which revealed a firm tender swelling in every way similar to those previously described. Ten days later the pain and tenderness had disappeared, but a slight enlargement of the costo-chondral junction persisted. As in the other cases, all investigations were negative.

### Commentary

In an analysis of the relevant literature it is unnecessary to refer to the frequent accounts of osteomyelitis of ribs due to typhoid, tuberculosis, syphilis, or pyogenic infections, as in the cases here reported there was no evidence of any bone disease. With regard to conditions confined to rib cartilage, Staehelin (1940) remarks that little is to be found on this subject in the literature, and we have been unable to trace any reports in English of cases similar to the above.

It is evident that, clinically, the cases here recorded closely resemble those described by Tietze and subsequent authors, and it seems probable that they represent the same morbid entity. The association with respiratory tract infections has not previously been noted. In each case the swelling was noticed by the patient himself or by a friend, and clinically it could not be disregarded. No fever which could not be attributed to other causes was present, except in Case 4. In each instance the swelling persisted for some time after the respiratory infection had subsided, and we were unable to observe complete return to normality in any case before discharge from hospital; indeed, Case 4 still presents symptoms and signs nine months after the onset. Special investigations have failed to throw further light on the aetiology of the syndrome.

With regard to the morbid anatomy, in a description of the biopsy findings Tietze writes: "The histological examination shows chondral tissue, the irregular arrangement of which suggests neoplasm, but there are no signs of malignancy. I therefore removed the entire mass, which consisted of two cartilages and part of the sternum. To our surprise the cartilages were not abnormal; the soft tissues, perichondrium, muscles, fascia, and ligaments were thickened, but microscopically did not show any inflammatory changes. The cartilages showed histological changes, described above, and here and there calcium deposits and dissolution into fibres." The similarity of this description to the findings at biopsy in Case 4 of our series is striking.

In discussing the aetiology Tietze tentatively suggested that the condition represented a dystrophic change in the cartilage analogous to the bone disease of nutritional origin which was prevalent in Germany in the early 1920's; but there has been no evidence of malnutrition in our patients, all young soldiers of good physique.

We cannot throw any light on the pathology of these swellings. Tietze's cases were all observed at a time when nutritional conditions in Germany were at their lowest ebb. This does not entirely apply to our cases, since, although the national dietary has altered, it is agreed that evidence of general malnutrition is lacking. Nevertheless, qualitative changes of which we are ignorant may be of aetiological significance.

### Summary

An account is given of a syndrome first described by Tietze in which non-suppurative non-specific swellings appear affecting rib cartilage, and 5 cases are added to the 16 already recorded. The association with respiratory tract infections has not previously been noted.

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D. Skinner and J. E. Edwards (*New Engl. J. Med.*, 1942, **226**, 8) record two cases of subacute bacterial endocarditis caused by an enterococcus in men aged 72 and 60. In the first case symptoms of endocarditis followed prostatectomy, and death took place seven months later. The necropsy showed typical vegetations on the mitral, aortic, and tricuspid valves. The organism (strain A) was recovered from the blood, vegetations, and an extracted tooth. In the second case the symptoms developed in a patient who had had cardiac decompensation for six years. The necropsy showed old rheumatic heart disease with vegetations on the mitral valve. The organism (strain O) was recovered from the blood before death and from the vegetations post mortem.

## THE CHEMICAL LUMINESCENCE TEST FOR BLOOD

### FORENSIC AND CLINICAL APPLICATIONS

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Although it is now some years since Specht (1937) first suggested the use of chemical luminescence for the identification of suspect blood-stains, it would seem that no references to the method have as yet appeared in the English literature. This reaction has been of considerable practical value in many technically difficult medico-legal cases and merits description. Its forensic use has led to other applications, and the clinical adaptation now described is simple and very delicate, though it has the disadvantage that it must be observed in the dark.

Gleu and Pfannstiel (1936) described the preparation of 3-amino-phthalic-acid-hydrazide-hydrochloride, and indicated that the alkaline solution, with the addition of hydrogen peroxide or sodium peroxide, produced a typical chemical luminescence with haematin. This reaction is the basis of the luminescence test for blood. One of two solutions may be used; they yield identical results:

A.	3-amino-phthalic-acid-hydrazide-hydrochloride	1 g.
	Sodium peroxide	5 g.
	Distilled water	1,000 ml.
B.	3-amino-phthalic-acid-hydrazide-hydrochloride	1 g.
	Sodium carbonate	50 g.
	Hydrogen peroxide (10 vol.)	50 ml.
	Distilled water	1,000 ml.

These solutions may show a trace of inherent luminescence. This is of no practical disadvantage, but may, if desired, be eliminated by the addition of a trace of indazolone-4-carboxylic acid. The solutions are effective when freshly prepared, and remain usable for years by the addition of about 10% of 20-vol. hydrogen peroxide to reactivate the quantity of stock solution required for a particular test.

### Forensic Application

In medico-legal cases blood-stains are normally identified by close inspection; a chemical test such as the benzidine reaction to exclude negative stains; positive identification of blood spectroscopically and perhaps with the help of various microscopical preparations; determination of the source of the blood by means of the precipitin reaction; and, in suitable cases, possibly identification of the blood group. In a number of cases, however (and not infrequently those in which the evidence as to blood-stains may be of the utmost value), the stains may be obscured for various reasons and the discovery of their position and content may be attended with more or less difficulty. The stains may be small in amount; they may be mixed with mud or ashes, or other interfering substance; they may have been more or less cleaned away off, say, dark or dirty clothes, off the ground, carpet, or walls, or off a weapon, and traces only may have remained in crevices or cracks; they may have been irregularly distributed in small amounts or difficult to discover on the ground, on dark or rusty or soiled or painted objects, or in cellars or other places not easily susceptible to complete and thorough examination; they may have been changed by temperature, weather, and age. In still other instances the blood may be mixed with or simulated by other stains such as paint, oil, fruit juices, rust, etc. In these cases of difficulty the luminescence test is of especial value.

The solution is introduced into an all-glass pressure-spray designed to produce a fine mist from a watery solution. When this mist falls on a stain containing haematin the result is a marked bluish-white luminescence which is clearly visible in the dark. The luminescence persists for some minutes and can readily be photographed. Very fresh blood-stains, con-