

Tietze's Syndrome: Report of Two Cases and Review of the Literature

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Tietze's syndrome, a nonsuppurative, tender swelling of the anterior chest wall, is a disorder of uncertain etiology and pathology, unassociated with constitutional disturbances, and of a prolonged fluctuating course. Familiarity with the uniform clinical manifestations of this relatively frequent entity makes its recognition fairly simple. The therapeutic approach includes reassurance of the patient as to the benign nature of this condition, along with supportive measures chiefly to allay pain.

Le syndrome de Tietze, un non-suppurative tumescencia de character hyperesthetic del pariete antero-thoracic, es un disordine de incerte etiologia e pathologia, non associate con disturbationes constitutional, e de curso fluctuante e prolongate. Familiaritate con le uniforme manifestationes clinic de iste relativamente frequente entitate rende su recognition satis simple. Le therapeutica include reassurar le patiente con respecto al character benigne de iste condition e le uso de mesuras supportative, principalmente pro alleviar le dolores.

TIETZE'S SYNDROME is a benign, self-limiting entity characterized by tender, nonsuppurative swelling in the region of the anterior chest wall. Tietze first described the condition by reporting four cases in 1921.¹ The review² of the world literature up to 1955 by Kayser disclosed 159 reported cases, of which only 7 had appeared in North American journals.^{3,4} The total number of reported cases of Tietze's syndrome now exceeds 250, with approximately half being reported in the short span of the five-year period between 1955 and 1960. Articles dealing with this subject have yet to appear in the English or American journals devoted to rheumatology.

Since the cause and pathology of this condition remain obscure, the term *Tietze's syndrome* is preferred to Tietze's disease. Other names affixed to this entity include costal chondritis, costochondral syndrome, thoracochondralgia, thoracochondritis, and chondropathia tuberosa. The purpose of this report is to describe two additional cases and review the 129 cases reported in the world literature since Kayser's comprehensive review of 1956.

CASE REPORTS

Case 1.—A 48-year-old, white, married salesman came to the medical outpatient clinic of the Jersey City Medical Center because of intermittent pain and swelling of four years' duration at the upper costosternal area. He did not recall either trauma or upper respiratory infection preceding the onset of symptoms. The pain occurred both at rest and during exertion and was not related to time of day, lasting from several minutes to hours and occasionally persisting for days. Relief could readily be obtained by the ingestion of aspirin and the local application of hot compresses. Pain and swelling were limited to the left side, until the six months preceding his visit, at which time it was confined to the right. Occasionally the pain radiated to the right shoulder. The attacks recurred every one to four

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weeks until three months before his clinic visit, when they began to occur several times each week. There were no prodromata.

Physical examination was unremarkable except for tenderness to palpation at the right second costosternal junction, and the presence of a supernumerary nipple at the left sixth interspace. No swelling was present during the examination.

He was seen again three weeks later because of recurrence of pain and swelling at the same site. A firm, spherical swelling, 3 x 3 x 1 cm., was present at the area of the right second costosternal junction. There was no heat, erythema, or fluctuation.

Chest x-rays, including posteroanterior and oblique views of the costosternal junction, were within normal limits. There was no evidence of soft tissue swelling. Laboratory data included a WBC count of 6,300, with a normal differential, hemoglobin of 17.0 Gm. per 100 ml., hematocrit of 50 per cent, an erythrocyte sedimentation rate (Wintrobe) of 10 mm. at 1 hour, and a serum uric acid of 3.1 mg. per cent. The latex agglutination test for rheumatoid factor(s) was negative, as were the serum VDRL and Mazzini.

The patient was reassured that the pain was not related to heart disease and that his condition was benign. He was instructed to take 0.9 Gm. of salicylates four times daily and to apply hot compresses when necessary. He had no attacks during the next two months of follow-up. When the continuous salicylate regimen was stopped, the attacks recurred. A monthly trial with continuous oral corticosteroids (1.0 mg. prednisone four times daily) also abated recurrence of symptoms.

Case 2.—A 22-year-old, white, married woman was being treated by her physician for iron deficiency anemia due to menorrhagia, when a swelling at the left sternoclavicular junction was found on routine physical examination. The swelling had been present for a year without any decrease in size. Though minimal tenderness to palpation had been present, there had never been any undue pain or discomfort. She had had an upper respiratory infection with cough during the week prior to the onset of swelling.

Physical examination was within normal limits except for a 2.5 x 6 x 2 cm. swelling at the left sternoclavicular junction, associated with slight tenderness to palpation. There was no heat, redness, or fluctuation. The skin moved freely over the swelling.

Results of radiographic examination of the chest, including special posteroanterior and oblique views of the affected area and the costosternal junctions, were within normal limits. Soft tissue swelling was not evident. The laboratory findings were within normal limits and included a WBC count of 6,400, with a normal differential, a hematocrit of 39 per cent, an erythrocyte sedimentation rate (Wintrobe) of 19 mm. at 1 hour, and a serum uric acid of 3.6 mg. per cent. The latex agglutination test was negative, as was the serum VDRL and Mazzini. No therapy was prescribed, except for reassurance of the patient as to the benign nature of her illness.*

The unique clinical pattern of anterior chest localization, lack of systemic manifestations, and negative laboratory and roentgenographic studies, leaves little doubt that both these patients had Tietze's syndrome.

LITERATURE REVIEW

This current review of the world literature^{5,7-8,10,12,18-44} has added 131 cases (including the two present cases) to Kayser's previously-reported 159.² The features of those cases reported since 1955, as compared with the data supplied by Kayser, as well as a composite of both, are supplied in tables 1 and 2. It appears that both sexes are affected equally. The right side was involved 106 times, the left 97. The majority of patients, or approximately 80 per cent, had only *single* lesions. Of the 48 having multiple involvement, 38 were unilateral and 10 bilateral. When the swellings are multiple, usually neighboring articula-

*The authors would like to thank Dr. Edward Bookrajian for permission to report the second case.

Table 1.—Some Clinical Features of the Reported Cases of Tietze's Syndrome

	Prior to 1955 (Kayser)	Since 1955 (Levey & Calabro)	Total (to 1960)
<i>Reported cases</i>	119*	131†	250
Male	59	53	112
Female	60	75	135
<i>Side of involvement</i>			
Right	33	73‡	106
Left	33	64‡	97
<i>Number of involved sites</i>			
Single	66	113	179
Multiple	30	18	48
<i>Of multiple sites</i>			
Unilateral	28	10	38
Bilateral	2	8	10

*Of 159 cases reported, Kayser could only collect data on 119.

†Three case reports did not state the sex.

‡Four case reports did not state the side of involvement.

tions on the same side are affected. However, there have been 10 reports of bilateral involvement. The second and third costosternal junctions were affected most often, with the second in 46 per cent of cases, and the third in 22 per cent. The sternoclavicular joint has only recently been regarded as a site of involvement; 10 cases (including our second case) having been reported since 1955.

DISCUSSION

Though no estimates of the incidence of Tietze's syndrome have been established, the large number of cases reported in recent years suggests that the entity is not uncommon. Most cases continue to go either unrecognized or unreported. The syndrome occurs in all age groups, with a preference for the third and fourth decades of life.⁵ There appears to be no occupational or racial predilection.²

Etiology Obscure

The cause of this entity remains unknown. The views of earlier writers, listing malnutrition and tuberculosis as important causes, are no longer held. Within the past decade, several additional theories have been proposed.

Table 2.—Rib Sites Involved

	1	2	3	4	5	6	7	8	9	10	SC	CA
Prior to 1955 (Kayser)	5	46	6	6	0	0	2	0	0	1	0	0
Since 1955 (Levey & Calabro)*	12	54	42	12	8	5	5	0	1	1	11	1
Total cases to 1960	17	100	48	18	8	5	7	0	1	2	11	1

SC = Sternoclavicular.

CA = Cricocarytenoid.

*Includes cases with multiple involvement.

Coventry¹ has postulated that obscure trauma, such as that due to coughing, is probably the cause of Tietze's syndrome. In support of this view is the finding that trauma, including coughing, has frequently been associated with the onset of symptoms. However, this theory does not account for the onset of attacks at rest, nor does it explain the remissions and exacerbations which often characterize this disease. It seems that the association with cough is variable, but perhaps significant.

There are even recent views to suggest the hypothesis that Tietze's syndrome may be a disease, not of cartilage at all, but of the surrounding ligaments.^{3,4} Motulsky and Rohn³ propose that the interarticular sternocostal ligament, which extends from the medial end of the second costal cartilage to the cartilagenous (or bony) junction of the manubrium with the body of the sternum, is the structure involved in this syndrome. This ligament, which is invariably present at the second sternocostal articulation, occurs at the other sternocostal junctions in the approximate incidence of the involvement of these cartilages by Tietze's syndrome. Moreover, these authors suggest either microtrauma or involvement by rheumatoid disease of this ligament, or a combination of both, as important factors in the pathogenesis of this syndrome. The lack of systemic manifestations, failure to involve other joints, and the inability to demonstrate rheumatoid factor(s) are arguments against a rheumatoid etiology. An alternate theory by Beck and Berkheiser⁴ incriminates an inflammatory reaction of the interarticular ligament. This results in a shortening of the involved ligament with buckling and anterior rotation of the adjacent cartilage. However, inflammation of ligaments and cartilage buckling have not been consistently disclosed.²

None of the proposed theories explain the basic etiology, in that each of them leaves many unanswered questions regarding many of the individual cases that have been reported.

Uniform Clinical Manifestations

Patients with Tietze's syndrome may interpret their pain as being due to heart disease and seek help on this account. Some, believing the swelling to be neoplastic, appear at tumor clinics. Still others have been referred to arthritis clinics, with a label of "arthritis."

The clinical manifestations are typical and consistently uniform. The usual sequence is the sudden or gradual onset of upper anterior chest pain associated with fusiform swelling of the involved costal cartilage. The pain is mild to severe in intensity and may or may not radiate to the shoulder and arm. It is often aggravated by sneezing, coughing, inspiration, bending, recumbency, and exertion. Inclement weather, anxiety, worry, and fatigue may intensify the pain.⁵ It is usually relieved by the administration of analgesics and the local application of heat. Though the course is variable, the pain and swelling are usually intermittent and last from a few days to several weeks. However, the swelling may persist for months to years.

Examination discloses a firm, tender, bullous or fusiform swelling, usually involving one or more of the upper costochondral or sternoclavicular articula-

tions. A case with involvement of the cricoarytenoid joint as well as the sternochondral cartilage has recently been reported.⁷ It is quite possible that as more cases are described, other areas of involvement will be disclosed. The skin is freely movable over the swelling. Though erythema of the overlying skin is usually absent, localized heat may be present. There is no regional lymphadenopathy. Systemic manifestations are entirely absent. The pain and tenderness usually subside in a few weeks to a few months, although the course may be longer, as in Case 2. The longest recorded course lasted eight years.⁸ It is more usual for the disease to be characterized by repeated exacerbations and remissions, as in Case 1. Attacks have been known to occur, even after several years of quiescence.⁵ Motulsky and Rohn believe that respiratory disease or rheumatoid arthritis frequently precede or accompany the syndrome.³

Criteria for Diagnosis

The rather unique clinical manifestations should suggest the diagnosis. However, two criteria should be met to confirm a diagnosis of Tietze's syndrome. First, there must be the presence of a distinct swelling, which may be tender and painful, at one or more of the costosternal junctions. Second, there must be absence of clear-cut evidence that could establish another definite diagnosis. A careful history and physical examination, together with a roentgenogram of the thorax and appropriate laboratory tests, are usually adequate to distinguish Tietze's syndrome from other disease entities.

Laboratory studies, including WBC count and differential, hematocrit, and erythrocyte sedimentation rate, are normal. Values for serum calcium, phosphorus, and acid and alkaline phosphatase have been found normal.⁹ An earlier report by De Haas⁹ of an associated minimal elevation of serum uric acid has not been substantiated.^{10*} Though only a limited number of patients have been studied, the latex agglutination test for rheumatoid factor(s) has been negative.

Radiologic studies are normal except for occasional reports of increased calcification at the affected sites.^{1,9,12} Skorneck¹² feels that hypertrophy of the costal cartilages, best demonstrated by tangential views, and excess calcification of these cartilages, may be typical of the disease. On the other hand, Kayser² believes that calcification is not a *sine qua non* for the occurrence of this syndrome. It would appear that the chief value of the radiographic examination of the chest is to exclude other diseases.

In a number of patients in whom exploration with biopsy was performed, gross findings have been difficult to interpret.² Some observers have noted swelling or edema of the perichondrium and soft tissues; others have not. It is not clear whether the abnormally prominent cartilage found in the majority of patients represents an increase in cartilage mass or simply a forward angulation. On histologic study, the complete absence of inflammatory changes in the cartilage or overlying soft tissue is striking.² Needle biopsy of these lesions has proved unsuccessful.

*It is now recognized that minimal amounts of salicylates may result in slight hyperuricemia.¹¹

Differential Diagnosis

The most important differentiation to be made is between Tietze's syndrome and myocardial infarction or angina pectoris. A careful history, physical examination, and an electrocardiogram usually resolve this problem.

Pyogenic, degenerative, rheumatoid, and gouty arthritic processes may also affect these joints. Though uncommon, acute pyogenic arthritis of the costochondral junctions should be suspected when the pain is severe, is accompanied by local spasm and marked tenderness, and when systemic manifestations occur as well. Monarticular bacterial arthritis of the sternoclavicular joint appears to be even rarer.¹³

Dorsal root pain due to degenerative joint changes of the thoracic spine, with impingement on intercostal nerves, may produce anterior chest pain. Osteoarthritis of the thoracic spine or anterior chest cage is usually part of a generalized process, as is degenerative joint disease occurring in the sternoclavicular joint.¹⁴

Rheumatoid arthritis, a systemic disease, often affects multiple joints in a bilateral and symmetrical fashion, whereas Tietze's syndrome is chiefly monarticular, and rarely bilateral. Moreover, in terms of frequency of *initial* involvement of individual joints, the anterior chest cage articulations are very rarely involved in peripheral rheumatoid arthritis. In a persistent monarticular involvement of an anterior chest cage articulation, it is therefore prudent to look for a cause other than rheumatoid disease. Rheumatoid spondylitis (ankylosing spondylitis) is unique, in that involvement of the chest wall is, as a rule, diffuse, and expansion of the chest cage is markedly diminished.¹⁵

Localized bouts of anterior chest pain due to gout have been described.¹⁶ These are not relieved by nitroglycerine but respond readily to colchicine. Colchicine offers no relief to patients with Tietze's syndrome.⁹

The painful xiphoid syndrome or xiphoidalgia is probably another example of Tietze's syndrome. It is characterized by spontaneous pain in the anterior chest associated with distinct discomfort and tenderness of the xiphoid process of the sternum.¹⁷ Pressure on the sternum reproduces the spontaneous pain, complete with its radiation, which may include pain deep within the chest, precordium, epigastrium, shoulder and back. Pain is often precipitated by any type of motion which moves the xiphoid. Like Tietze's syndrome, this condition may persist for weeks or months but ordinarily will disappear without treatment.

The entity "tender fat," is probably a functional state, occurring in patients with a low threshold of pain.⁶ The tenderness is diffuse and is not localized to the thoracic cage alone. *Adiposa dolorosa* (Dercum's disease) may be a form of this generalized rheumatic process, though it is probably a separate syndrome.⁶

Fractured rib(s), without a definite history of injury, produce(s) a point of exquisite tenderness along the course of one or more ribs. The fracture may be difficult to demonstrate roentgenographically until the fourth or fifth week, at which time the callus calcifies. Because of their rich blood supply, the ribs

are especially prone to metastatic involvement. However, the *posterior* portion of the ribs is usually affected because of its proximity to the vertebral veins.

Other conditions causing pain and/or swelling of, or about, the costal cartilages include pyogenic osteomyelitis, chronic osteomyelitis, osteochondritis, primary tumors, intercostal neuritis, pulmonary embolism and infarction, pneumothorax, pleurisy, presternal edema of mumps, leukemia, Hodgkin's disease, multiple myeloma, herpes zoster, and pleurodynia.

Therapy—Supportive

Since the disease is for the most part self-limiting, nonspecific therapy such as the application of local heat, and the administration of salicylates or other analgesics, are often beneficial in tiding the patient over a period of exacerbation. It is especially important that the patient with Tietze's syndrome be reassured of the benign character of the disorder. Even prolonged courses are better tolerated if the patient understands the nature of the disorder.

Local irradiation has been disappointing.¹⁸ Infiltration of the affected area with procaine has had some success in providing temporary relief.¹⁹ Of seven patients receiving repeated Novocain blocks, there were no relapses in a six month follow-up.²⁰ The local infiltration of hydrocortisone and analogues has been used with success by several workers,^{5,21-22} as has the oral administration of adrenocorticosteroids.²³⁻²⁵ Beck and Berkheiser⁴ report surgical resection of the cartilage, without recurrences following operation, in four cases with follow-ups of six months to two years. Perhaps this approach may be reserved for refractory cases or further pathologic studies.

SUMMARY

Tietze's syndrome is characterized by a tender, nonsuppurative swelling in the region of the anterior chest wall. Two cases are presented and the world literature is reviewed.

There is no certainty as to etiology or pathology of this condition. Only the symptomatology is quite uniform—with localized anterior chest pain usually persisting for a few days to a few weeks, while swelling may continue for months or even years. Most patients have only single lesions, with the second and third costosternal junctions being affected most often.

Therapy is mainly symptomatic, consisting of salicylates, local application of heat, and reassurance of the patient. Local procaine or hydrocortisone injections may be of value. The relative frequency of Tietze's syndrome necessitates inclusion of this entity in the differential diagnosis of anterior chest wall pain and/or swelling.

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