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A review, analysis, and commentary

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INTRODUCTION

I. Regarding diagnoses, the medical student is frequently if ungrammatically reminded, "You only find what you are looking for". This admonition naturally applies to all physicians and presupposes a knowledge of what to suspect and recognize. It's the purpose of this paper to present a discussion and review of Cyriax' Syndrome, a clinical entity which has been conspicuously neglected in the literature and major medical and surgical texts, hoping to alert the examining physician to consider this disorder in the differential diagnosis of abdominal, thoracic or back pain of obscure etiology.

According to Holmes (15) this syndrome is characterized by abnormal mobility and deformity of the anterior rib and rib cartilage at the interchondial articulations, most frequently in the eigth, ninth and tenth vertebrochondral ribs. He and several others believe it to be of fairly common occurrence, causing irksome and frequently incapacitating symptoms, the chief of these being pain referable to the thorax, abdomen or back which may be mistaken for a symptom of severe visceral disease. Diagnosis of this syndrome is made

from the history and physical findings, and a cure is obtained by simple surgical procedure.

In support of my choice to consider this relatively obscure syndrome I cite three writers commenting on Cyriax' Syndrome:

1. Holmes (16)
   Because of failure to recognize this syndrome needless laparotomies have been performed and prolonged suffering and incapacity from an easily curable condition are often permitted. These facts justify an attempt to secure a better understanding and a more general recognition of this entity.

2. Davies-Colley (8)
   ..... it is curious that it (Cyriax' Syndrome) should receive no recognition in modern texts of surgery.

3. Brisgard (3)
   .....it (Cyriax' Syndrome) has received but little attention in medical literature.

II. HISTORICAL REVIEW

In 1901 Harrison (13) observed a patient with this symptom whom he reported to be suffering from a dislocation of the ninth rib. J.J. Clarke (5) added three cases in 1908 with a diagnosis of "Painful Displacement of a Rib". Two of these cases were treated by excision of the involved costal cartilage with complete cures resulting in both.

An article appeared in The Practitioner in 1919 entitled, "On Various Conditions that May Simulate the Reffered Pains of Visciral Disease and a Consideration of These from the Point of View of Cause and Effect", written by Edgar F. Cyriax (6) of the Medico-Psychological Clinic, London. The author described a patient who presented with dyspepsia and dull epegatpric pain of "many years duration", who was cured by manual replacement of a slipped rib cartilage. This was the first report evidencing a recognition of the importance of considering this diagnosis in the patient with painful symptoms seemingly of deep visceral origin.

Davies-Colley (8) in 1922 reported two cases in The British Medical Journal under the title "Slipping Rib". One of these, a woman, underwent a laparotomy for adhesions suspected to be causing her symptoms before the correct diagnosis was made one year later. Both patients were finally treated and cured by surgical excision of the offending rib cartilage. The author commented:

> It (Cyriax' Syndrome) is probably not a rare condition and is trivial enough in itself, but gives rise to most irksome symptoms. In its (the pain's) position in the chest and costal margins it resembles that due to so many deeper lesions of the abdomen and thorax that I think it is quite likely that many cases occur in which such an apparently unimportant cause as a movable rib cartilage is unsuspected and the diagnosis missed.

The above report brought forth a rash of other communications, no less than eight appearing in the same journal in 1922. Marshall (24) described arthritis in the involved joint in one of his cases at surgery, and included himself as a sufferer with this syndrome. Poyuton (26) contributed three cases, one of whom narrowly averted a spleenectomy for her supposedly visceral disease. He is the first to mention the association of Cyriax' Syndrome with repeated heavy lifting or bending and to emphasize as a part of the course of treatment both improved nutrition and most importantly reassurance of the patient concerning more serious organic diseases. Soltan's cases (30) had been previously treated for a considerable period of time for visceroptosis, but was later found to have involvement of a floating rib (eleventh) as were two of Clarke's (5) patients. Mahon (23) stated that he had seen "several" cases, one without pain, but reported observation on only two.

An interesting case was reported by Russell (28) in 1924. A twenty-six year old woman presented with back pain of eight years duration had forced her to remain in bed for the past sixteen months. The pain had begun during a game of golf and due to increasing

severity had caused her for some time to walk "like a crab". She hadbeen treated in various ways for a movable kidney, and an operation was contemplated before the correct diagnosis of slipping tenth left costal cartilage was made. Following resection of this cartilage she was able to walk normally and reported six months later that she was able to play "five sets of tennis in the afternoon."

The first American report of Cyriax' Syndrome was made by Brisgard (3) from the University of Chicago clinics in 1931. The patient was a sixteen year old female with known rheumatic heart disease who complained of sudden attacks of stabbing right upper abdominal pain associated with nausea and vomiting. Excision of the involved cartilage produced a cure. Significantly, this is the first report of multiple cartilage involvement and of microscopic examination of a surgical specimen which showed normal cartilage. Later in the same year Darly (7) reported a second case from America which was treated and cured by excision.

Ballon and Spector (2) in 1938 made the first comprehensive review of the meager literature to that date, and enlarged it with ten cases of their own. Among these new cases were patients with erroneous

diagnosis such as angina pectoris, metestatic tumor of rib, corneary thrombosis, gall bladder disease, pulmonary infarction and kidney disease, all of whom were finally recognized and treated as cases of Cyriax' Syndrome. Important in their discussion is the emphasis that this syndrome is diagnosed by history and physical findings, that it commonly follows direct or indirect trauma to the thorax or upper extremities, and the plea that more physicians be made aware of its existance.

J.F. Holmes had the most extensive experience with this syndrome, contributing three articles (14,15,16) during 1941 and 1942 which included forty-six cases of his own and seven more made known to him by personal communication. In his three articles he reported the case histories of nineteen patients and stressed the importance of indirect trauma as an etiological agent, the result often preceding the onset of symptoms by many years. Twenty-two of his cases were treated surgically, all with complete success. Of interest is his observation that severe whooping cough in a child, and repeated long and difficult labor in two women appeared to be the basis for indirect trauma which culminated in a case of Cyriax' Syndrome.

Telford (31) reported a case from Canada in 1950

in which a middle-aged man collapsed due to severe left chest pain radiating to his left jaw and down the inner aspect of his left arm. Electrocardiographic, and blood studies remained normal in spite of the fact that the patient experienced two similar attacks in the next twenty-four hours, associated with shortness of breath, diaphoresis nausea, and faintness. At this time a repeat physical examination revealed that an attack could be precipitated by pressure on the eighth left costal cartilage which was deformed and abnormally mobile. These two signs; 1) reproduction of pain by pressure over the offending costal cartilage, and 2) deformity of the involved cartilage were recognized correctly by Telford as being consistantly found in patients with Cyriax' Syndrome.

"Nerve Nipping at the Intercostal Margin" was the title of a paper by Stevenson (29) in 1951 in which he reported having seen twelve cases, five of which he described. Three of his patients were first thought to have heart disease due to histories of prostrating precordial pain, associated with feeling faint, shortness of breath and tachycardia. One patient narrowly averted a laparotomy for suspected adhesions secondary to a previous operation. In all cases treated, conservative management consisting of

strapping and reassurance concerning a fear of serious visceral involvement led to improvement. Important to the recognition of the clinical findings in this disorder was Stevenson's description of the two pain patterns usually found in Cyriax' Syndrome. ~~The~~ The first type is a dull, continous pain, often described as burning and radiating frequently to the back. This combination frequently raises the question of gall bladder disease. The second type is a sharp, stabbing pain of sudden onset with radiation similar to that described in angina pectoris or myocardial infarction. The onset of this pain is often related to a change of body position, but not to exertion and is not relieved by rest.

Also of great importance was the author's observation that most of these cases occurred in highly anxious people who improved greatly following negative examinations for visceral disease and a rational explanation of their disorder by the physician. It was Stevenson's feeling that the patient's incapacity was directly proportionate to his anxiety concerning serious illness. Stevenson's incisive grasp of the clinical picture of Cyriax' Syndrome and his cogent observation were surpassed only by his total ignorance of any prior references to this entity in the literature.

In a note at the end of the article the author expressed his thanks to a colleague who had advised him that his "new" entity was referred to in the literature as Cyriax' Syndrome or Slipping Rib and cited Davies-Colley's report.

The most recent contribution was that of Arthurton (1) in 1952, describing the youngest patient yet observed under the title "Slipping Rib in a Newborn." A full term five pound male infant delivered by Caesarian section was noted to be cyanotic with inspiratory recession of the lower ribs bilaterally. Severe atelectasis was diagnosed and antibiotic and oxygen therapy were begun. There was a sharp snap heard during auscultation of the chest which was localized by fluroscopy to the sixth rib cartilage. It was therefore felt that the sixth, seventh and eight ribs were "slipping" over each other due to the severe lung collapse. Five days later the child was improved, there being present no rib recession or snap. At eighteen months of age the child was normal and healthy without residua from this episode.

III. ANATOMY AND PATHOLOGICAL MECHANISM

It is generally agreed in the literature that loosening of the costochondral articulation is the first event in this syndrome, usually (14) at the anterior ends of the vertebrochondral ribs (eighth, ninth, tenth). This loosening allows the abnormal mobility of the involved ribs and the upward curling deformity of the loosened rib cartilage follows from the trauma of repeatedly slipping underneath the rib above. Pain, thus, is secondary to the slipping rib and cartilage impinging upon the intercostal nerve as it runs beneath the lower border of the rib above. Certain motions or manipulations of this deformed cartilage cause it to slip under the rib border above causing either a sharp click felt by the patient and sometimes the examiner, or a sensation of something slipping or giving away at the rib margins, both associated with a sharp pain. This is the true slipping rib.

But in other cases, the rib cartilage is permanantly displaced and constantly riding under the rib above causing a dull, continous, burning type of pain. This would seem to be the mechanism for the two types of pain described by Stevenson (29) and shows that Cyriax's Syndrome may be due to either a "slipping"

or a permanantly displaced or"slipped" rib cartilage.

A knowledge of the anatomy of the rib margins and costochondral joints is indispencible in understanding this syndrome and its protean manifestations. The reader is referred to the standard anatomy and neuroanatomy texts for a complete review of these regions (11,25), In short, the anterior rib cartilage of the vetebrochondral ribs are connected to those above by only a fibrous attachment between and a similar supporting hammock both supporting the cartilage ends and enclosing the costochondral articulations. An encircling attachment of this type lends both desired joint mobility and, simultaneously, unwanted instability which increases suscptibility to trauma. Important in this context is a statement made by Howard Lilienthal (18): "The weakest part of the thorax is the costochondral line on each side."

With reference to symptoms it is helpful to bear in mind the muscle origins, insertions, actions and nerve supply involved at the rib margins, and the incessant motion in this region necessitated by respiration. Again the reader is commended to the standard texts to review the above. Suffice it to say that the intercostal nerves run along the lower border of the rib above and are therefore all exposed to trauma

from a properly located lesion of the type already described. As pointed out first by Cyriax, the association of the intercostal nerves with the sympathetic system including, therefore, the cardiac, epigastric and hypogastric plexi and visceral connections, and the communication between the lumbar plexus and the thoracoabdominal intercostal nerves (1,7,11) through the iliohypogactric nerve accounts for the wide spectrum of pain symptoms found in this syndrome suggesting serious visceral lesions.

The fact that deep, serious organic disease is frequently simulated by this condition constitutes its chief importance in medical practice which was first recognized and emphasized by Cyriax. As may be noted from the bibliography, most of the cases in the literature have been described under the titles "Slipping Rib," Slipping Rib Cartilage" or "Slipping Rib Syndrome." Each of the above titles describes only one of the mechanisms which can produce this syndrome, namely that causing the sharp intermittant pain, and gathers under this same name the large number of cases in which the rib cartilage is permanantly displaced or "slipped" causing a dull, continuous type of pain. I therefore suggest that the term "Cyriax' Syndrome" be used to include both

types of pathology and pain patterns found in this condition in order that emphasis be placed on recognition of the many disguises this syndrome may assume as Cyriax first noted.

IV ETIOLOGY

From a review of the literature it would seem that loosening and subsequent abnormal mobility of the anterior rib cartilage may begin acutely as a partial separation of the previously described fibrous attachments or by a frank fracture of the cartilage. More commonly, however, this abnormal mobility seems to result from multiple episodes of indirect trauma such a heavy lifting, which stretches the fibroses attachments over a period of time. Thus it seems reasonable that trauma direct or indirect would be the etiological background for this condition.

The deformity of the involved cartilage may result from a displaced fracture fragment, but in the vast majority of cases reported seems to be an upward curling of the loosened end secondary to repeated contact with the rib above without fracture.

Holmes (15) analyzing sixty-eight cases in 1941 found indirect injury in thirty-six cases and direct

injury in fourteen. In six cases direct and indirect trauma was reported and in twelve cases no attempt was made to elicit a history of trauma. Ballon and Spector (2) stated in summery:

> In most instances the slipping rib develops as a result of injury but the patient frequently fails to attach any importance to the injury.

Since traumatic incidents appear so commonly in these cases and because there is frequently a considerable time lag between the seemingly insignificant injury and the development of symptoms, it is usually necessary to retake the history with detailed consideration of possible types of direct and indirect trauma.

Examples of direct injury in the literature are: falling against the side of a bath tub or striking the costal margin on a steering wheel. However, a history of indirect trauma is more subtle and difficult to elicit, examples being: sudden flexion, extension or twisting of the trunk; repeated distortion of the body by one-sided weight carrying; sudden pulling or pushing of the arms as in weight lifting, golf or bowling; forced compression or expansion of the chest and abdomen as in childbirth or coughing. Therefore, a meticulous history for trauma direct or indirect must be elicited for this may be the only indication of the true nature of the patient's complaints.

That nerve irritation by the upward displacement of the loosened cartilage is the cause of the pain is emphasized by the fact that in all reported cases the pain has permanantly disappeared following removal of the deformed cartilage. In one case (24) arthritic changes in the involved joint were observed. However, pathological examination of surgical specimens from patients with this condition has uniformly revealed no abnormalities. Nor do there appear to be any associated or predisposing diseases.

It is, therefore, generally agreed that a carefully taken history will reveal direct or indirect trauma to be the prime etiologic factor in this syndrome.

V. CLINICAL FINDINGS IN 50 REPORTED CASES

(See table pages 32-38)

Out of the ninety-five cases of Cyriax' Syndrome reported in the literature, only fifty patients have been fully described and Table I presents an abstract of the significant clinical data from these cases.

1. Age and Sex: (Table 1)

This is of no practial consideration, there being 27 females and 23 males ranging from the newborn

period to 64 years old.

2. Presenting Complaint: (Table I and IV)

In all reported cases this was pain, commonly with associated complaints secondary to the pain. These associated complaints include breathlessness, palpitations, syncope, and inability to walk normally. As shown in Table II 18 cases manifested sharp, intermittant pain, 23 the dull continuous type and in 9 cases a combination of the two pictures was observed.

3. Duration of Symptoms: (Table I)

This ranged from an immediate onset following trauma to one man who had tolerated his symptoms for six years. There was no constant time relation between the defined time of injury and the first symptoms. However, the time lag following indirect injury seems to be consistant with the previously described etiology and anatomical mechanism of this syndrome.

4. Prior Physical Trauma: (Tables I and IV)

A history of trauma was elicited in 34 patients, 20 found to have suffered a direct injury and 14 having suffered various indirect forms of trauma. This is perhaps a falsely low percentage because of history of prior trauma was not sought in 13 cases of the 50 reported.

5. Pain

A. Primary site- (Table IO

There was no common site of consistant pattern of pain. Neither was there a consistant relationship between the pain location and the anatomical site of the lesion. Primary pain sites included the anterior chest; precordum; sternum, under the costal margins, the epigastrum, both upper abdominal q uadrants; the flank, groin, and center of the lumbar vertebral column.

B. Radiation of pa in- (Table I)

Forty per cent of the patients experienced radiating pain, which occurred in the back, both flanks, left shoulder and jaw, inner aspect of the left arm, across the abdomen and into the groin. Significantly the incidence of misdiagnosis was higher in these patients.

C. Character of pain- (Table I-IV)

As noted in (2.) above there were two characteristic types of pain reported either acute, sharp and stabbing or dull, continuous and burning and in several patients these were combined. Of particular diagnostic importance was the lack of correlation between the onset of pain and exertion or meals and the various body positions or movements which either excited or relieved the painful symptoms.

In Table IV it can be seen that 34 patients had a sensation of either a click or snap or a feeling of something slipping at the rib borders in association with their pain. Attempts by the physician to reproduce these sensations frequently led to the correct diagnosis.

6. Associated signs and symptoms (Table I)

In 33 patients there were significant associated findings which in no small measure both increased the examiner's confusion and the patient's anxiety and incapacity. The most frequent of these was the previously described clicking or slipping sensation. Also prominent were: 1) nausea and vomiting; 2) dyspepsia; 3) breathlessness; 4) feeling faint; 5) palpitation; 6) profuse diaphoresis; 7) grinding sensation in the chest; 8) expiratory grunt; 9) mass on the chest wall; 10) spinal curvature; 11) various derangements of carriage or body movement. It is thus evident how confusing the clinical findings and how troublesome to the patient the effects of this small lesion can be. Table IV shows that 19 of these patients were unable to carry on normal physical activity due to this syndrome.

7. Associated disease (Table I)

Eleven patients are reported to have had simultaneous associated disease, there being, however, no consistant

relationship to any particular disease. These included: gall bladder disease; rheumatic heart disease; arterioscleroticheart disease; arthiritis; lung neoplasm. Prior surgical procedures in 4 patients suggested the possibility of adhesions.

8. Erroneous diagnosis and management (Table I)

Incorrect initial diagnoses were made in 22 patients, necessitating numerous expensive diagnostic studies and one fruitless laparotomy. Nine other laparotomies were advised but none carried out. Also considered was a radical mastectomy and a lumbar disc exploration. Three patients were treated as cardiac invalid for varying periods of time and two wore supports for viceroptosis. Erroneous diagnoses included: old adhesions; splenic infarction; gastric or duodenal ulcer; angina pectoris; myocardial infarction; pleurisy; viciroptosis; metastatic disease of the rib; breast neoplasm; lumbar disc disease; gall bladder disease and venal infection. Without an understanding of this entity and the manner by which to confirm the diagnoses the physician would be forced to resort to extensive diagnostic studies to rule out many of the above mentioned processes which Cyriax' Syndrome may mimic. As will be shown later this diagnosis can consistantly be made from history and physicial findings

alone and must be considered in all patients with abdominal or thoracic pain of obscure etiology.

9. Treatment and results (Table III)

Of the 50 cases in Table I the type of treatment administered is reported in 41 cases. Twelve were managed conservatively with manual replacement of the slipped rib, immobilization by strapping, improved nutrition and reassurance. Of these 12 cases three were considered cured and four relieved. A total of 29 patients were treated surgically with excision of the deformed cartilage, all of these being relieved and without recurrence of symptoms. A majority of the patients who came to surgery had first been managed conservatively without lasting improvement. There was no mobidity or mortality associated with surgical treatment.

10. Location of lesion (Table II)

Table II indicates the position and number of lesions as reported in 37 cases. Twenty-nine lesions were reported on the right and thirty-two on the left. Holmes (14) (15) (16) repeatedly emphasizes that this syndrome involves only the vertebrochondral or eighth, ninth and tenth ribs and in this series seventy-five per cent of the lesions did occur in this distribution. However, Table II shows that lesions as high as the

third rib and also in the floating ribs eleven and twelve may occur in Cyriax' Syndrome. The importance of examining all the ribs and their articulations when one suspect this condition is therefore obvious.

Also of importance and previously not noted in the literature is the fact that more than fifty per cent of the patients had multiple ribs involved. This again underscores the need for detailed examination of the chest wall and illustrates the need for examination of adjacent cartilages at operation. In Holmes' (14) (15) series, reoperation was necessary in two patients due to a second involved cartilage missed during the initial operation.

VI. DIAGNOSIS

1. History

Cyriax' Syndrome or Slipping Rib Syndrome should be considered in any patient with chest, abdominal or back pain. At least in part the pain should occur near the rib margins and is usually one of two types:

Type 1.) Acute onset, occurring in the intermittent attacks and stabbing.

Type 2.) Continuous or nearly so, dull and burning. A combination of these two types may be seen.

It is important to elicit both alleviating and exacerbating factors. Pain will increase most commonly with flexion or torsion of the trunk, change in position of the upper extremities or deep breathing. Relief is most frequently obtained in the supine position or lying on the side of the lesion. There is no relation to food intake and usually only certain types of exertion, again composed of the above actions will excite the pain which is not rapidly relieved by rest unless the particular alleviating body position is assumed.

A majority of patients will report a click, snap, slipping sensation or feeling of "something giving away" at the rib border in association with their pain and infrequently a palpable mass will be reported at the painful site.

However, it is not unusual for the patient to be completely unaware of chest tenderness or the associated sensations and to be concerned over the bizare radiating pains and incapacity it has caused him, in no little way confusing the examiner.

At this point close questioning must be employed to elicit a history of direct or indirect trauma often so insignificant that the patient does not associate it with his problem. Inquiry must be made as to

occupation and movements required, heavy lifting, athletic participation, diseases associated with straining or coughing, prolonged and difficult labo r, and any other unusual stresses of the upper extremities or trunk to which the patient has been exposed.

2. Physical Examination

Even if none of the above history is obtained the general physical examination should include both deep and light palputation of all the ribs and their anterior articulations. As seen in Table IV reproduction of the painful symptoms by pressure or or manipulation of the involved rib and cartilage is the sine qua non of Cyriax' Syndrome, occuring in all patients reported.

Holmes (15) describes the following method of examining the ribs for this sign:

> By digital examination with the patient in the supine position and the knees flexed an area of tenderness at the rib borders is noted, pressure upon which will reporduce the patient's pain, especially where the examiner's fingers are well under the rib border and pressing outwards. At the same time the abnormally moveable and curled cartilage with its associated click and pain may be demonstrated.

In the acute case muscle spasm may make the above examination meaningless and the diagnosis must then be

made by repeated later examinations or by palpating the click and deformity with the patient anesthetized.

Further suggestive findings are a limitation of chest expansion on inspiration and abnormalities of carriage or action of the upper extremities. Gait and posture both sitting and standing should be observed and twisting and flexing the trunk plus moving the extremities through their full range of motion are equally important. Frequently these motions either can not be carried out or will elicit the pain.

3. Laboratory and X-ray studies

Cyriax' Syndrome is diagnosed from the history and physical findings, there being no characteristic laboratory or X-ray findings. In general diagnostic studies should begin only after examination of the chest has ruled out this diagnosis.

However, one X-ray of the chest should always be obtained to investigate any complicating or concurrent diseases of the chest.

4. Differential diagnosis

It is not within the scope of this presentation nor the writer's knowledge to enter into a complete

discussion of the causes of obscure thoracic, abdominal and back pain. In recent years various "anterior chest wall" symdromes have been described including the Precordial Catch Syndrome, Tietze's Syndrome, Costochondritis, and many others, all mimicing more serious diseases of the chest and all without any definable underlying pathological process. To lump Cyriax' Syndrome or Slipping Rib Syndrome with this host of other chest wall symptoms under the name "The Rib Syndrome" is the subject of a recent paper by M.S. Rawlings (27) who suggests that all these entities are interrelated, representing a single pathological process. However, no pathological pr ocess is described and it is reported that pathological examination of the involved site is normal and the conditions are self-limited. This is certainly not the case in Cyriax' Syndrome which has infinitely more protean manifestations than the other syndromes in this group, is not self-limited, and which has a well defined pathological mechanism. It would therefore seem prudent to regard it as a separate entity under the names used in this presentation at the risk of being a "splitter rather than a "lumper."

I would briefly like to mention one other condition of the same type and affecting the same region as Cryiax' Syndrome which also simulates thoracic or abdominal disease.

Xiphoidalgia or the Syndrome of the Hypersensitive Xiphoid is beautifully reviewed by Burman and Sinberg (4). This disorder was first observed in 1712 and the most recent report was that of Lipkin (20) in 1955. Patients present complaining of pain in the chest, abdoman, back or shoulder described as a deep nauseating ache, dull but rarely burning, never of acute onset and lasting minutes to hours. Exciting factors are bending, stooping, lifting, turning over in bed, and walking after eating a heavy meal. Significantly there is rarely a history of any kind of trauma.

The diagnosis is made by physical examination, the patient's symptoms being reproduced by moderate pressure on the Xiphoid process. Normally moderate pressure in this area produces vague discomfort but only in Xiphoidalgia is the pain pattern produced. Pressure must sometimes be maintained for several minutes to produce these findings.

As with Cyriax' Syndrome, the diagnosis of

Xiphoidalgia will be easily missed unless the examiner has a high index of suspicion and palpates the Xiphoid during physical examination.

Of special significance is the frequent association of Xiphoidalgia with coronary artery disease, peptic ulcer, esophageal lesions, gall bladder disease and hiatus hernia and a diagnosis of Xiphoidalgia, unlike Cyriax' Syndrome, warrants a careful search for one of the above mentioned disorders.

Treatment is much the same as in Cyriax' Syndrome including 1) procaine and steroid infiltration of the Xiphoid area 2) treatment of associated disease 3) reassurance 4) surgical excision if necessary.

VII. TREATMENT OF CYRIAX' SYNDROME

In spite of the unqualified success of surgical treatment (i.e. excision of the involved cartilage) all authors seem agreed that a trial of conservative therapy is first indicated. This usually co nsists of closed manual replacement of the cartilage and immobilization by strapping followed by a limitation of strenuous activity for several months. Pain may be relieved by intercostal nerve blocks or by procaine and steroid infiltration of the affected area.

However, cartilage is very poorly vascularized and has limited healing potential so that union of the dislocated or fractured rib cartilage is neither easily nor frequently accomplished. Unlike other rib, and costochondral syndromes this lesion is neither inflammatory nor self-limiting and therefore the response to procaine and steroid infiltration is usually only a temporary relief of pain.

As previously noted, Table III of the 41 cases in the literature in which treatment is specifically mentioned conservative therapy produced improvement in 7 out of 12 patients. On the other hand surgical treatment by excision led to complete and immediate curve in the 29 patients so treated, several of whom had previously been managed conservatively without relief.

Holme's operation (14) is quite simple, consisting of an incision following the curve of the ninth rib from the costal margin to the mid-axillary line which enables the operator to view and manipulate also the eighth and tenth ribs. The muscles are retracted laterally and the involved cartilage disarticulated and removed. A similar procedure can be adapted for any cartilage depending upon the involved site, thereby allowing the operator to examine also the cartilage

immediately above and below. There has been no mortality reported with this operation which can be carried out under local anesthesia.

Conspicuously absent are any reports of intercostal nerve section as a treatment for this condition. This procedure could also be carried out under local anesthesia and would seem to be of particular value in older and otherwise poor surgical risk patients.

Stevenson (29) has placed considerable stress on the importance of reassuring the patient regarding serious organic disease by means of a thorough examination explanation of the nature and cause of the symptoms. Some patients so put at ease are able and willing to tolerate their symptoms which, he reports, frequently decreases after such a consultation.

VIII. SUMMARY

Cyriax's Syndrome or Slipping Rib Syndrome is due to a lesion of the anterior junction of the costal cartilage and their supporting fibrous structures secondary to either direct or indirect trauma which allows abnormal mobility of the rib in this area with subsequent deformity of the involved cartilage and irritation of neighboring nerves which produces pain.

The precipitating event is often minor or repeated minor stresses, frequently not associated by the patient with his complaints.

Due to the wide distribution of nerves involved (the intercostal being connected to the brachial and lumbar plexuses and the sympathetic chain, thus to the cardiac, celiac and hypogastric plexuses) the pain manifestations are widespread and frequently mimic the symptoms of serious thoracic or intra-abdominal disorders. The pain is characteristically one of two types; either acute, sharp and stabbing or dull, burning and continuous. The spectrum of severity ranges from mild, well-tolerated discomfort to almost total disability.

The diagnosis is made from the history and careful physical examination of the anterior rib junctions, during which the patient's symptoms are reproduced by pressure over and manipulation of the involved area, often producing a characteristic clicking sensation.

Treatment is conservative in the acute phase with strapping and local procaine and steroid infiltration, surgical excision of the involved cartilage being curative in the refractory case. Of greatest importance is reassurance of the patient that serious visceral disease is not the basis of his symptoms.

A review of the existing literature concerning this syndrome with analysis and commentary on 50 case reports has been presented. Methods of diagnosis and treatment have been discussed.

The importance of this syndrome in medical practice lies in its ability to mimic more serious diseases, confusing the physician, necessitating needless and expensive diagnositc studies, and causing great anxiety and incapacitation to the patient, all due to a benign and easily remidiable disorder. It is urged that physicians maintain a high index of suspicion regarding Cyriax' Syndrome in all patients with obscure back, chest or abdominal pain, and routinely carry out a careful examination of the anterior rib junctions.

TABLE I

CLINICAL FINDINGS IN 50 CASES OF CYRIAX' SYNDROME

	Age and Sex	Presenting Complaint	Prior Trauma	Pain: Primary Site	Pain: Radiation	Pain: Character	Associated Findings	Associated Disease	Erroneous Diagnoses	Lesion; Treatment Results
1.	30 yr./F	chest pain	indirect-l. arm	l. ant. chest	l. lower back	acute with deep breathing	nausea with pain			dislocated 9th costal cartilage
2.	12 yr./F	pain in rib borders		costal margins bilat.			spinal curvature			dislocated 12th costal cartilage bilat. resected. cured
3.	23 yr./F	chest pain		l. ant. chest	back					resected 12 th l. rib. cured
4.	F.	abdominal pain		R.U.Q. and rib margins			arthiritis of spine			dislocated 8th l. costal cartilage
5.	M.	dyspepsia epigastricpain		epigastrium		dull	nausea, eructations			dislocated8th l. costal cartilage. manual reduction
6.	42 yr./F	abdominal pain	indirect, to r. arm	R.U.Q.	back	dull, constant	nausea	gall bladder operation	adhesions had neg. laparotomy	slipping r. 10th. rib resected. cured
7.	17 yr./F.	pain l. side on bending		l. anterior chest	l. shoulder	acute, sharp stabbing				slipping l. 9th. and 10th. ribs. resected. cured.
8.	M.	chest pain		r. anterior chest		dull, constant	X-ray: arthiritis r. 3rd. cartilage			resected slipping r. 3rd. costal cartilage. cured
9.	M.	chest pain on bending		l. anterior chest	l. shoulder and arm	acute, sharp stabbing				
10.	F.	chest pain		l. anterior chest		dull, constant	nausea, vomiting			Conservative treatment 1. manual reduction of slipped rib. 2. immobilization 3. improved diet 4. reassurance results not reported
11.	F.	abdominal pain		L.U.Q.		dull, constant				
12.	F.	chest pain		l. anterior chest		dull, constant				
13.	30 yr./F.	abdominal pain	heavy lifting	L.U.Q.				previous operation	abdominal adhesions	slipping l. 11th rib. resected. cured.
14.	M.	chest pain	heavy lifting	l. anterior chest		dull, constant				unknown site. cured by resection.

Table I (cont'd)

	Age and Sex	Presenting Complaint	Prior Trauma	Pain: Primary Site	Pain: Radiation	Pain: Character	Associated Findings	Associated Disease	Erroneous Diagnoses	Losion; Treatment Results
15.	M.	chest pain	heavy lifting	r. anterior chest		dull, constant				
16.	26 yr./F	abdominal pain	strain playing golf	L.U.Q.	back	dull, constant	could not walk normally bed-ridden		viceroptous laparotomy considered	dislocated 9th costal cartilage. resected, cured.
17.	16 yr./F	abdominal pain		R.U.Q.		acute, sharp stabbing inc. with bending	nausea, vomiting. slipping sensation and soreness at 5th r. cartilage	rheumatic heart disease		slipping r. 5th. and 6th. costal cartilage. resected, cured.
18.	M.	chest pain	began with playing golf	precordial	l. jaw, shoulder, arm	sharp	weakness and sweating		angina pectoris	slipping l. 5th. costal cartilage. resected, cured.
19.	M.	painful rib, swelling	strained in r. arm	swelling				ca. right lung.	metastatic tumor	resected slipping r. 5th. costal cartilage. no pain in 1½y. until death
20.	M.	chest pain	fell in bath tub	l. ant. chest		dull, with sharp episodes	nausea, dyspnea, eructations	coronary artery disease	myocardial infarct, pulmonary infarct, pleurisy	slipping l. 7th. rib. corset for support. relieved.
21.	M.	chest pain	car accident	r. ant. chest	up along sternum	inc. by r. arm abduction	clicking sensation with pain		tumor	relieved by immobilization
22.	M.	abdominal pain		L.U.Q. and flank	back	dull continuous	clicking sensation		low kidney laparotomy advised	relieved by chest binder
23.	28 yr./F	abdominal pain	yes	R.U.Q.		sharp, piercing	dyspepsia slipping of r. ribs.		gall bladder disease. lap. suggested	slipping cartilage resected cured.
24.	26 yr./M/	abdominal pain		R.U.Q.		acute, sharp inc. by motion and breathing	grinding sensation in pain area			slipping costal cartilage resected with cure.
25.	20 yr./F.	chest pain	direct	l. costal margin		sharp, with twisting or bending	relieved in suping position			slipping l. 10th. costal cartilage, resected. cured.
26.	57 r./M/	chest pain causing abdominalgait	indirect	r. costal margin		dull, constant	slipping sensation click. pain forced crouched posture			dislocated r. 8th. 9th, and 10th. cartilage resected. cured.

Table I (cont'd)

	Age and Sex	Presenting Complaint	Prior Trauma	Pain: Primary Site	Pain: Radiation	Pain: Character	Associated Findings	Associated Disease	Erroneous Diagnoses	Lesions; Treatment Results
27.	19 yr./F.	chest pain abnormal posture	direct auto accident	bilat. rib borders	bilat. to back	dull, constant	clicking sensation			excised dislocated 8th and 9th cartilage. cured
28.	55 yr./M.	back pain could not sit or stand	direct	center of back	l. costal margin	dull, constant. sharp periods			lumbar disc. disease. laparotomy advised	dislocated 9th. cartilage excised. cured
29.	29 yr./M.	chest pain, unable to move arms	indirect	L.U.Q.		dull, constant	nausea clicking			strapping relieved. excised r. 8th. cartilage. cured
30.	17 yr./M.	abdominal pain	indirect	L.U.Q.		dull, constant				strapping without relief excised l. 10th cartilage cured
31.	51 yr./F.	pain under l. breast	indirect	over 9th. l. cartilage		dull, constant	3 cm. mass. slipping feeling		breast neoplasm	strapping without relief excised l. 9th. cartilage cured.
32.	34 yr./F.	chest pain	direct. car accident	l. costal margin		dull, constant with sharp episodes	slipping and clicking sensation			excised 10th. and 11th. cartilage bilat. cured.
33.	20 y./F.	abdominal pain	indirect	R.U.Q. and r. lower chest		long and difficult labor	slipping, click nausea	previous gall bladder op.	adhesions lap. considered	excised r. 9th. and 10th. cartilage. cured
34.	40 yr/ M.	chest pain	indirect lifting	r. costal margin		dull, constant. inc. with deep breathing	slipping sensation			dislocated r. 9th. and 10th. cartilage excised. cured
35.	22 yr./M.	chest pain	indirect pushing	costal margin bilat.	to back	dull with sharp episodes				excised 9th. and 10th. cartilage bilat. cured
36.	6 yr./M.	abdominal pain	indirect car accident	epegastrum		dull, constant	walked crouched over. vomiting		laparotomy advised	excised 10th. cartilage bilat. cured.
37.	7 yr./M.	abdominal pain; strange gait	after severe whooping cough	abdomen		sharp prostrating			hernia repair 2 yrs. prior. adhesions	excised slipping 10th. cartilage bilat. cured.
38.	45 yr./M.	chest pain	direct	l.costal margin		sharp	clicking sensation			excised r. 8th. cartilage no relief. excised r. 9th. cured.

Table I (cont'd)

	Age and Sex	Presenting Complaint	Prior Trauma	Pain: Primary Site	Pain: Radiation	Pain: Character	Associated Findings	Associated Disease	Erroneous Diagnoses	Lesions; Troatment Results
39.	30 yr./F.	abdominal pain	prolonged labor	R.U.Q. and r. costal margin		dull, constant	click		gall bladder disease. lap. advised	excised r. 9th. cartilage cured.
40.	40 yr./F.	chest and abdominal pain.dyspnea palpitations	direct	ant. chest bilat. and epigastrum	back-bilat.	dull with sharp episodes	clicking sensation		g.b. disease peptic ulcer, lap. advised	excised r. 9th. and 10th., l. 10th. cartilages. cured.
41.	25 yr./F.	chest pain	direct ex. l.1 vertibra	costal margin bilat.		inc. with breathing				excised 9th and 10th cartilag bilat. cured.
42.	47 yr./F.	abdominal pain	direct	epigastrum	. . back	sharp stabbing attacks			abdominal neoplasm	excised 10th cartilage bilat. cured.
43.	17 yr./F.	r. side and back pain 6 yrs. duration	direct	R.U.Q	R.L.Q. and back	sharp stabbing attacks	nausea,vomiting		4 neg. skelteal and gall bladder x-ray studies	ex cised l. 10th and r. 9th.,10th.11th. cartilages cured.
44.	50 yr./M.	chest pain causing syncope		precorduim	along sternum l. jaw and l. inner arm	acute, "electric shock"	collapse, dyspnea sweating		myocardial infarction	slipping l. 8th. costal cartilage. surgery pending.
45.	64 yr./M.	chest pain		l. anterior chest	back	dull, burning				dislocated l. 9th. and 10th. cartilage. relieved by strapping
46.	43 yr./F.	chest pain		l. anterior chest		sharp	dyspnea		angina. 3 neg. E.C.G.'s	slipping l. costal cartilages
47.	47 yr./F.	chest pain 2 episodes		l. costal margin L.U.Q.		sharp cutting	becomes pale, fainting		angina	slipping l. costal cartilages
48.	20 yr./F.	abdominal pain		R.U.Q.	old abd. scar,r.groin and back	constant burning		recent appendectomy	adhesions ureteral colic,laparotomy advised	slipping r. costal cartilages
49.	13 yr./F.	chest pain palputation		l. ant. chest		sharp 5-10 min. attack	dyspnea techycardia		cardiac arrythmica	slipping l. 9th. and loth. cartilages
50.	newborn M.	cyanosis, labored respirations	difficult labor. Caesarian delivery				expiratory grant rib retraction palpable click snapping sound x-ray nl. rib case. severe atelectoris			fluroscopy showed click and snap at r. 6th,7th. and 9th. costal cartilages. overriding ribs due to severe post-partum atelectases. oztent and antibiotics. healthy and without residue at 18 months.

TABLE II

SITE OF LESIONS IN 37 CASES OF CYRIAX' SYNDROME

Costal Cartilages	Right	Left	
3	1		
4			
5	2	1	
6	2		
7	2		
8	6	3	Vertebro-chondral ribs
9	9	9	site of 70 % of lesion
10	2	14	
11	3	3	
12	1	2	
	29	32	

TABLE III

RESULTS OF TREATMENT IN 41 CASES OF CYRIAX' SYNDROME

Type of Treatment	Number Treated	Number Improved	Number Cured	Recurrances
Conservative	12	4	3	unknown
Surgical	29		29	none

TABLE IV

RELATIVE OCCURRANCE OF SIGNIFICANT CLINICAL FINDINGS IN 50 CASES OF CYRIAX' SYNDROME

1. Pain as initial complaint		50 cases
sharp intermittant	18	
dull, constant	23	
combined	9	
2. History of trauma		34 cases
direct	20	
indirect	14	
3. Palpably deformed cartilage		15 cases
4. Clicking sensation with pain attacks		14 cases
5. Abnormal mobility of involved rib		13 cases
6. Slipping rib sensation		9 cases
7. Abnormal body carriage, gait or actions		7 cases
8. Decreased chest expansion		7 cases
9. Mass on chest wall		5 cases
10. Patients unable to carry on normal activities due to this disorder		19 cases
11. Reproduction of pain symptoms by pressure on involved area		50 cases

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