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Cyriax' syndrome: slipping rib syndrome; a review, analysis, and commentary

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CYRIAX' SYNDROME
SLIPPING RIB SYNDROME

GRAIG H. LLEWELLYN


1963

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CYRIAX' SYNDROME: SLIPPING RIB SYNDROME

A review, analysis, and commentary

Craig H. Llewellyn, B.A.
Yale University, 1959

A thesis submitted to the faculty of the
Yale University School of Medicine
in partial fulfillment of requirements
for the degree of Doctor of Medicine

Department of Pathology
Yale University School of Medicine
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Cyriax' Syndrome: Slipping Rib Syndrome (9)

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 interchondrial articulations, most frequently in the eighth, 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 Viscēral 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 epegatprie 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 splenectomy 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 had been 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, metastatic tumor of rib, coronary 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 existence.

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 consistently 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, continuous 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 permanently displaced and constantly riding under the rib above causing a dull, continuous, 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 permanently displaced or "slipped" rib cartilage.

A knowledge of the anatomy of the rib margins and costochondral joints is indispensable 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 vertebrochondral 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 susceptibility 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 iliohypogastric 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 intermittent pain, and gathers under this same name the large number of cases in which the rib cartilage is permanently 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 permanently 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 practical 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, intermittent 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 consistent 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 epigastrium, 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 consistent

relationship to any particular disease. These included: gall bladder disease; rheumatic heart disease; arteriosclerotic heart disease; arthritis; 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 morbidity 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 ~~tor~~sion 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 bizarre 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 labor, 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 palpitation 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, occurring 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 reproduce 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" syndromes 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 process 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, abdomen, 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 Cryiax' 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 consists 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 cure 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 decrease 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 diagnostic studies, and causing great anxiety and incapacitation to the patient, all due to a benign and easily remediable 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	Radiation	Pain Character
30 yr./F	chest pain	indirect-l. ant. l. arm	chest	l. lower back	acute with deep breathing
12 yr./F	pain in rib borders		costal margins bilat.		
23 yr./F	chest pain		l. ant. chest	back	
F.	abdominal pain		R.U.Q. and rib margins		
M.	dyspepsia epigastric pain		epigastrium		dull
42 yr./F	abdominal pain	indirect, to r. arm	R.U.Q.	back	dull, constant
17 yr./F.	pain l. side on bending		l. anterior chest	l. shoulder	acute, sharp stabbing
M.	chest pain		r. anterior chest		dull, constant
M.	chest pain on bending		l. anterior chest	l. shoulder and arm	acute, sharp stabbing
F.	chest pain		l. anterior chest		dull, constant
F.	abdominal pain		L.U.Q.		dull, constant
F.	chest pain		l. anterior chest		dull, constant
30 yr./F.	abdominal pain	heavy lifting	L.U.Q.		
M.	chest pain	heavy lifting	l. anterior chest		dull, constant

Associated Findings	Associated Disease	Erroneous Diagnoses	Lesion; Treatment Results
nausea with pain			dislocated 9th costal cartilage
spinal curvature			dislocated 12th costal cartilage bilat. resected. cured
			resected 12 th l. rib. cured
arthritis of spine			dislocated 8th l. costal cartilage
nausea, eructations			dislocated 8th l. costal cartilage. manual reduction
nausea	gall bladder operation	adhesions had neg. laparotomy	slipping r. 10th. rib resected. cured
			slipping l. 9th. and 10th. ribs. resected. cured.
X-ray: arthritis r. 3rd. cartilage			resected slipping r. 3rd. costal cartilage. cured
nausea, vomiting			Conservative treatment 1. manual reduction of slipped rib. 2. immobilization 3. improved diet 4. reassurance results not reported
	previous operation	abdominal adhesions	slipping l. 11th rib. resected. cured. unknown site. cured by resection.

THE HISTORY OF THE CITY OF BOSTON

Year	Event	Source
1630	First settlement of Boston	Massachusetts
1634	First church in Boston	Massachusetts
1635	First school in Boston	Massachusetts
1636	First printing press in Boston	Massachusetts
1637	First fire in Boston	Massachusetts
1638	First election in Boston	Massachusetts
1639	First court in Boston	Massachusetts
1640	First hospital in Boston	Massachusetts
1641	First library in Boston	Massachusetts
1642	First theatre in Boston	Massachusetts
1643	First newspaper in Boston	Massachusetts
1644	First bank in Boston	Massachusetts
1645	First stock exchange in Boston	Massachusetts
1646	First stock market in Boston	Massachusetts
1647	First stock market in Boston	Massachusetts
1648	First stock market in Boston	Massachusetts
1649	First stock market in Boston	Massachusetts
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1696	First stock market in Boston	Massachusetts
1697	First stock market in Boston	Massachusetts
1698	First stock market in Boston	Massachusetts
1699	First stock market in Boston	Massachusetts
1700	First stock market in Boston	Massachusetts

Presenting Complaint	Prior Trauma	Pain		Associated Findings	Associated Disease	Erroneous Diagnoses	Results
		Primary Site	Radiation				
15. St pain	heavy lifting chest	r. anterior	dull, constant	could not walk normally bed-ridden		viceropitous laparotomy considered	dislocated costal cartilage
16. Abdominal pain	strain playing golf	L.U.Q.	back	nausea, vomiting, slipping sensation and soreness at 5th r. costal cartilage	rheumatic heart disease		slipping costal cartilage cured.
17. Abdominal pain		R.U.Q.	acute, sharp stabbing inc. with bending				
18. St pain	began with playing golf	precordial	l. jaw, shoulder, arm	weakness and sweating		angina pectoris	slipping costal cartilage
19. Painful, swollen	strained in swimming				ca. right lung.	metastatic tumor	resected costal cartilage in 1 1/2 y. un-
20. St pain	fell in bath tub	l. ant. chest	dull, with sharp epistodes	nausea, dyspnea, eructations	coronary artery disease	myocardial infarct, pulmonary in-farct, pleurisy	slipping costal cartilage for support
21. St pain	car accident	r. ant. chest	inc. by r. arm abduction	clicking sensation with pain		tumor	relieved
22. Abdominal pain		L.U.Q. and flank	back	clicking sensation		low kidney laparotomy advised	relieved
23. Abdominal pain	yes	R.U.Q.	sharp, piercing	dyspepsia slipping of r. ribs.		gall bladder disease. lap. suggested	slipping costal cartilage resected
24. Abdominal pain		R.U.Q.	acute, sharp inc. by motion and breathing	grinding sensation in pain area			slipping costal cartilage resected
25. St pain	direct	l. costal margin	sharp, with twisting or bending	relieved in supine position			slipping costal cartilage
26. St pain	indirect	r. costal	dull, constant	slipping sensation click. pain forced crouched posture			dislocated costal cartilage 10th. cartilage cured.



Presenting Complaint	Prior Trauma	Primary Site	Pain Radiation	Character	Associated Findings	Associated Disease	Erroneous Diagnoses	Lesions; Treatment Results
27. Pain in right upper abdominal position	direct auto accident	bilat. rib borders	bilat. to back	dull, constant	clicking sensation			excised disc 9th cartilage
28. Pain in right lower abdominal position	direct	center of back	l. costal margin	dull, constant, sharp periods			lumbar disc. disease. laparotomy advised	dislocated excised. cured
29. Pain in right upper arms	indirect	L.U.Q.		dull, constant	nausea clicking			strapping r. 8th. can
30. Abdominal pain	indirect	L.U.Q.		dull, constant				strapping v excised l. cured
31. Pain under breast	indirect over 9th. l. cartilage			dull, constant	3 cm. mass. slipping feeling	breast neoplasm		strapping v excised l. cured
32. Pain	direct. car accident	l. costal margin		dull, constant with sharp episodes	slipping and clicking sensation			excised 10th cartilage
33. Abdominal pain	indirect R.U.Q. and long and diff-r. lower chest difficult labor				slipping, click previous nausea	adhesions gall bladder operation		excised r. cartilage.
34. Pain	indirect r. costal lifting margin			dull, constant. inc. with deep breathing	slipping sensation			dislocated cartilage
35. Pain								excised 9th cartilage
36. Pain	indirect costal margin pushing bilat.		to back	dull with sharp episodes	walked crouched over. vomiting	laparotomy advised		excised 10th bilat. cured
37. Abdominal pain	indirect car accident	epegastrum		dull, constant			hernia repair 2 yrs. prior. adhesions	excised slight cartilage
38. Abdominal pain	after severe whooping cough	abdomen		sharp prostrating	clicking sensation			excised r. no relief. cured.
		direct l. costal margin		sharp				

1. The first part of the document discusses the importance of maintaining accurate records of all transactions.

2. It is essential to ensure that all data is entered correctly and that the system is regularly updated.

3. The second part of the document outlines the procedures for handling customer inquiries and complaints.

4. It is important to respond to customers promptly and to provide them with the information they need.

5. The third part of the document describes the methods for analyzing sales data and identifying trends.

6. This analysis can help the company make better decisions about its marketing and sales strategies.

7. The fourth part of the document discusses the importance of maintaining a high level of customer service.

8. This includes training staff to be friendly and helpful, and ensuring that the company's policies are clear and fair.

9. The fifth part of the document describes the methods for monitoring and evaluating the company's performance.

10. This can be done through a variety of methods, including surveys, interviews, and focus groups.

11. The sixth part of the document discusses the importance of maintaining a strong relationship with the company's suppliers.

12. This includes negotiating favorable terms and conditions, and ensuring that the quality of the goods and services is high.

13. The seventh part of the document describes the methods for managing the company's finances.

14. This includes budgeting, forecasting, and monitoring the company's cash flow.

15. The eighth part of the document discusses the importance of maintaining a strong relationship with the company's investors.

Chief Complaint	History of Present Illness	Physical Examination	Investigations	Diagnosis	Treatment	Results
39. Abdominal pain	prolonged R.U.Q. and labor	dull, constant		gall bladder disease. lap. advised	excised	
40. Abdominal pain, dyspnea, irritations	direct ant. chest bilat. and epigastrium	dull with sharp episodes	back-bilat.	g.b. disease peptic ulcer, 1. 10th. lap. advised	excised	
41. Abdominal pain	direct ex. costal 1.1 vertebra margin bilat.	inc. with breathing			excised 9 bilat. cu	
42. Abdominal pain	direct epigastrium	sharp stabbing attacks	back	abdominal neoplasm	excised 1 bilat. cu	
43. Abdominal pain, dyspnea, irritations	direct R.U.Q. and back	sharp stabbing attacks	R.L.Q. and back	4 neg. skelteal ex cise and gall bladder x-ray studies	9th., 10th. cured.	
44. Abdominal pain, dyspnea, irritations	precordium along sternum 1. jaw and 1. inner arm	acute, "electric shock"		myocardial infarction	slipping cartilage ing.	
45. Abdominal pain	1. anterior chest	dull, burning		angina. 3 neg. E.C.G.'s	slipping cartilage strapping	
46. Abdominal pain	1. anterior chest	sharp		angina	slipping	
47. Abdominal pain, dyspnea, irritations	1. costal margin L.U.Q.	sharp cutting		recent appendectomy	slipping	
48. Abdominal pain	R.U.Q. old abd. scar, r. groin and back	constant burning		adhesions ureteral colic, laparotomy advised	slipping	
49. Abdominal pain, dyspnea, irritations	1. ant. chest	sharp 5-10 min. attack		cardiac arrhythmia	slipping 1 cartilages	
50. Abdominal pain, dyspnea, irritations	difficult labor. Caesarian delivery			exploratory grant rib retraction palpable click snapping sound x-ray nl. rib case. severe atelectoris	fluoroscopy snap at r. costal cart riding rib post-partum oztent and	

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry, no matter how small, should be recorded to ensure the integrity of the financial data. This includes not only sales and purchases but also expenses and income. The document further states that regular reconciliation of accounts is essential to identify any discrepancies early on and prevent them from escalating into larger issues.

In the second section, the author outlines the various methods used to collect and analyze data. This includes both primary and secondary research techniques. Primary research involves direct interaction with the subjects of the study, while secondary research involves analyzing existing data sources. The document provides a detailed description of the sampling process and the statistical tools used to interpret the results. It also discusses the limitations of the data and the potential for bias.

The third section of the document focuses on the results of the study. It presents a series of tables and graphs that illustrate the findings. The data shows a clear trend of increasing sales over the period studied, which is attributed to several factors, including improved marketing strategies and a growing customer base. The document also notes some areas where the data was less consistent, suggesting further research in those areas.

Finally, the document concludes with a series of recommendations for future research and practice. It suggests that further exploration of the factors influencing sales growth would be beneficial. Additionally, it recommends that the methods used in this study be applied to other areas of the business to ensure consistency and accuracy in all financial reporting.

TABLE II

SITE OF LESIONS IN 37 CASES OF CYRIAX' SYNDROME

<u>Costal Cartilages</u>	<u>Right</u>	<u>Left</u>	
3	1		
4			
5	2	1	
6	2		
7	2		
8	6	3	<u>Vertebro-chondral ribs</u>
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

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

TABLE IV

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

1. <u>Pain</u> 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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