



Slipping Rib Syndrome: A review of evaluation, diagnosis and treatment

Lisa E. McMahan

Division of Pediatric Surgery, Phoenix Children's Hospital, 1919 E Thomas Road, Phoenix, Arizona 85016; Mayo Clinic School of Medicine Arizona, Phoenix, Arizona; University of Arizona School of Medicine, Phoenix, Arizona. United States

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ABSTRACT

Slipping rib syndrome (SRS) is an under-diagnosed cause of intermittent, yet often debilitating lower rib and abdominal pain. SRS is caused by a hypermobility of the anterior false ribs that allows the 8th–10th ribs to slip or click as the cartilaginous rib tip abuts or slips under the rib above. Pain occurs from impingement of the intercostal nerve passing along the undersurface of the adjacent rib. Studies consistently find patients reporting months to years of typical pain symptoms, unnecessary tests and procedures prior to diagnosis. SRS is a clinical diagnosis, but dynamic ultrasound can be helpful for confirmation or diagnosis in difficult cases. Resection of the slipping rib cartilages is the mainstay of treatment, with good results for pain relief. Rib stabilization is an emerging option for recurrent symptoms.

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Introduction

Slipping rib syndrome (SRS) is an under-diagnosed cause of intermittent, yet often debilitating lower rib and abdominal pain. SRS is frequently associated with a popping or slipping sensation, giving it its name. The syndrome is caused by a hypermobility of the anterior false ribs, either from disruption of fibrous articulation, or a congenital deformity that allows for the 8th–10th ribs to slip or click as the cartilaginous rib tip abuts or slips under the rib above. Pain occurs from impingement of the intercostal nerve passing along the undersurface of the adjacent rib. SRS can affect patients at any age and its true prevalence is unknown due to frequent under-diagnosis. The upper abdominal location of the pain may prompt many unnecessary tests, so knowledge of the syndrome is critical to its timely and appropriate evaluation and treatment.

Background

Slipping rib syndrome was first described in 1919 by Cyriax, as an anterior rib dislocation causing pain due to impingement of the intercostal nerves. It was hypothesized that the terminal nerves, which run at the inferior border of each cartilage, were irritated due to the abnormally subluxing rib.¹

The first operation was described in 1922 when Davies–Colley performed resection of a mobile 10th rib cartilage, which was incidentally found on laparotomy for pain. There was subsequent relief

of symptoms in a 42 year-old female domestic servant. His second case was of a 17 year-old girl whose 10th rib moved abnormally, protruded and was painful with flexion. Removal of this cartilage also resulted in relief.²

Although this publication was well received, little broad notice was taken and its presence in surgical textbooks is lacking. Since 1922, almost *four hundred* cases have been reported in the literature, yet this diagnosis still remains elusive to most physicians and some surgeons (Fig. 1).

The pain in SRS is caused when the lower costal cartilages (ribs 8 through 10, i.e. ribs which are not directly connected to the sternum), lose their fibrous or cartilaginous attachments to each other. The pain and clicking sensation is also sometimes reported in the floating ribs, 11 and 12 (Fig. 2). This lack of attachment allows the cartilages to sublux, anteriorly or posteriorly with movements such as twisting, bending, deep breathing, sitting, sneezing, or coughing. The resulting irritation to the intercostal nerves may cause intermittent sharp, stabbing pain, followed by dull aching pain or a burning sensation. The initial pain is usually described as lasting a few minutes, and the dull pain is described as lasting hours. Some patients describe attaining temporary relief by stretching the affected side or placing pressure on the area. Prolonged periods of rest are often required to alleviate the pain. This pain may also be associated with nausea and vomiting when severe.

The symptoms of SRS may also be vague and misinterpreted as abdominal pain due to interconnections between intercostal nerves and somatic visceral nerves. Innervation of the intercostal nerves and visceral sympathetics converge at the same spinal cord levels

E-mail address: lmcmahan@phoenixchildrens.com

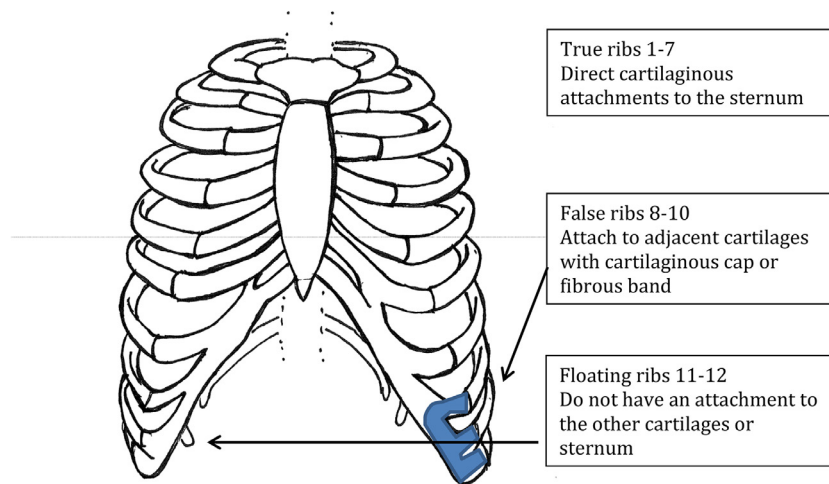


Fig. 1. Normal chest wall anatomy.

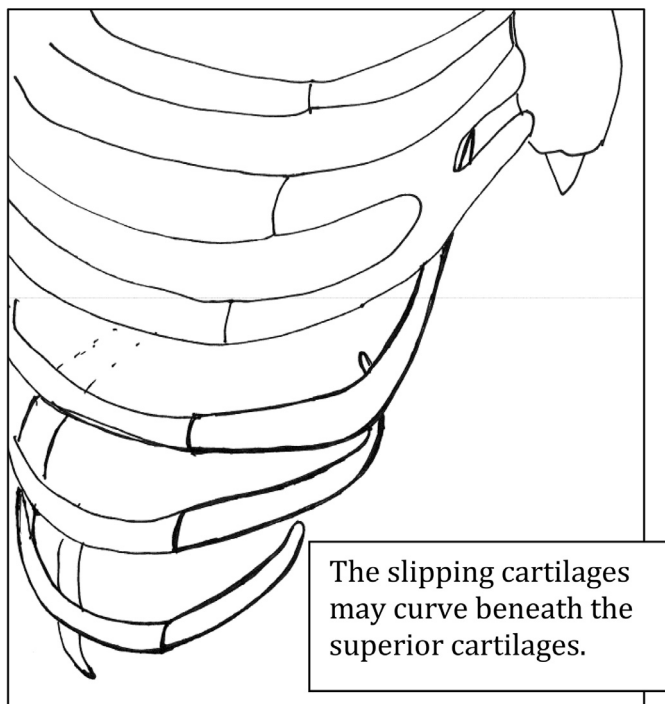


Fig. 2. Lateral view of lower chest wall demonstrating detached, deformed slipping costal cartilages 8, 9 and 10. The lack of cartilaginous attachment allows the cartilages to move and slide beneath each other, irritating the intercostal nerves and causing pain.

as the slipping ribs, namely the 8th and 9th.^{3–6} This can cause pain that may seem intraabdominal in nature.^{7–10}

The pain can be confusing for medical practitioners, and many patients undergo unnecessary testing and procedures to try to identify the source of the pain. Radiographs, computed tomography (CT) scan, Magnetic Resonance (MR) imaging, Positron Emission Tomography (PET) scans, diagnostic procedures such as laparotomy and laparoscopy have all been performed with negative result in patients prior to their correct diagnosis of slipping rib syndrome.^{10–13} The lack of radiographic findings for the cause for the pain is frustrating for physicians and patients alike.

The differential diagnosis of SRS is long and includes chest wall issues such as rib fracture, Tietze syndrome, costochondritis, and pleuritic pain. Abdominal pathology such as biliary dis-

ease, hepato-splenic issues, peptic ulcer, renal colic, esophagitis, and pancreatitis may also be implicated.

Historically, SRS has had many different names:

- Clicking rib syndrome
- Rib-tip syndrome
- Painful rib syndrome
- Slipping-rib-cartilage syndrome
- Painful rib syndrome
- Nerve nipping
- Gliding ribs
- Displaced ribs
- Interchondral subluxation
- Traumatic intercostal neuritis
- Twelfth rib syndrome
- Cyriax syndrome

Although early authors claimed that the condition was always unilateral,³ multiple reports of bilateral SRS have been reported.^{5,11,14,15} Usually there is one dominant symptomatic side, but either side may be affected equally. Initially the sparse reports determined that the right side predominated, and it was hypothesized that this was due to the predominance of right-handedness, but as more reports came forth, left and right sides were found to be equal.^{11,16–19}

Slipping rib syndrome can occur in any age group; the oldest patient reported is 86 years of age²⁰ and the youngest 7 years.¹⁴ Females and female athletes in particular are more frequently affected than males,^{14, 21,22} and this may possibly be related to hormonal shifts and joint laxity.²³ Multiple reports of SRS in athletes especially in swimmers, indicate that this group is at risk for SRS and SRS is likely due to the higher demands placed on their bodies.^{24,25}

Foley et al were the first to mention hypermobility as a predictor of slipping rib syndrome. Their group found that among the athletes studied, 1/5th were hypermobile.²² Diagnosing hypermobility is difficult, but in normal practice, asking a patient about hyperflexible joints may be enough. Some patients may have laxity and subluxation of the contralateral cartilages without symptoms. Additionally, they may even feel a clicking sensation without pain.

An association with SRS and psychological diagnoses exists. The difficulty with this association is that there is often a long delay from seeking care to obtaining a correct diagnosis. This may be months to years.^{9,11,19} Patients may seek care from multiple medical practitioners without relief from their symptoms and when no organic cause can be found, they become frustrated and of-

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