

complete resolution of symptoms with absence of stridor was observed.

Our study showed good initial outcomes of CO<sub>2</sub> laser surgery in all patients, but also a high rate of recurrence, consistent with previous reports by other authors.<sup>2</sup> We also observed that when oral corticosteroids were used as the first-line treatment in a later period, patients developed complications (Cushing syndrome).<sup>3</sup>

However, when a propranolol treatment protocol started to be implemented in pediatric patients with a diagnosis of subglottic haemangioma, stridor resolved in our patients at three, four and seven days after initiation of treatment, so that they could be discharged to outpatient follow-up care. This quick clinical response to propranolol has been observed by other researchers.<sup>4</sup> The low incidence of subglottic haemangioma precludes the possibility of conducting studies with large sample sizes, and while we have observed promising results, there is not enough evidence to assert that treatment with propranolol will suffice in all cases.

To date, propranolol has allowed an effective and safe management with good disease control in the three patients treated with it. Although we have not observed any adverse effects in these three patients, we must remain alert to the potential development of adverse effects associated with beta-blockers, such as hypotension, bronchospasm and hypoglycaemia, which can be dangerous in the pediatric age group.

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## Appendicitis in infants. 25 year case series<sup>☆</sup>



### Appendicitis en lactantes. Casuística de 25 años

To the Editor:

Appendicitis has been extensively studied in early childhood (age 2–5 years), in which it is characterised by the following: (a) nonspecific and atypical symptoms (diarrhoea may be present in 33–50% of cases in this age group); (b) delayed diagnosis; (c) advanced forms of disease (gangrenous/perforated/appendiceal mass); (d) atypical bacteria and (e) a higher rate of postoperative complications.<sup>1,2</sup>

However, case series in the youngest age group (infants and toddlers <24 months)<sup>3–6</sup> are few and small in size. Our aim was to learn the particular features of appendicitis in this age group.

We conducted a retrospective study by reviewing the cases of appendicitis in patients aged 1–24 months that underwent appendectomy in a paediatric surgery department over a 25-year period (February 1990 to February 2015). To do so, we searched the medical records, narrowing them down by age and diagnosis. The analysis did not

include cases of appendicitis in newborns, as they have a different aetiology and pathophysiology. We did a descriptive analysis of the following variables: clinical presentation, physical examination, diagnostic tests, duration of symptoms, findings, microbiological characteristics, and short- and long-term complications.

Thirteen young children underwent surgery, with a mean age of 20.2 months (range, 16–23). The time elapsed from the onset of symptoms to surgery was 3.8 days (range, 1–7 days). The most frequent symptoms were abdominal pain (100%), fever (92%), diarrhoea (76.9%) and vomiting (69.2%). The physical examination found nonspecific abdominal tenderness (23%), signs of peritonitis (30.8%), abdominal distension (30.8%) and omphalitis (15.4%) (Fig. 1). The workup revealed moderate leukocytosis (mean, 15,598; median, 14,092; range 9180–29,640 cells/mm<sup>3</sup>). Ultrasound findings with identification of the appendix or appendiceal masses were only diagnostic in 23% of the patients. In all others, sonographic findings were nonspecific (mild to moderate free fluid, hypoperistalsis or lack of abnormal findings). One patient underwent computed tomography scan that led to the diagnosis of an inflammatory appendiceal mass. The surgical approach used in all cases was the classic McBurney incision. Surgery revealed gangrenous appendicitis in two patients (30.8%), perforated appendices in eight (61.4%) and appendiceal masses in three (23.1%). The bacteria involved most frequently were *E. coli* (84.6%), *P. aeruginosa* (46.1%), *E. faecalis* (46.1%), *Eikenella corrodens* (30.7%) and anaerobes (*Streptococcus milleri*, *Bacteroides fragilis*). In most cases (61.4%), more than one bacterium was isolated from the ascitic fluid. The

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**Figure 1** Omphalitis caused by contiguity and abdominal distension in the early postoperative period in a toddler aged 23 months operated for a perforated appendicitis.

mean length of stay was 9 days (range, 6–13). Antibiotic treatment varied widely during the 25-year period (ampicillin + gentamicin + cefotaxime; amoxicillin-clavulanate + gentamicin + clindamycin; ampicillin + cefotaxime; metronidazole + gentamicin; piperacillin-tazobactam, meropenem, etc.). Initially, the antibiotherapy protocol called for the treatment of complicated appendicitis with ampicillin + gentamicin + cefotaxime. Later, in the most recent cases, the treatment prescribed was monotherapy with piperacillin-tazobactam. The complications that developed in the postoperative period were infectious in nature: two (15%) intra-abdominal abscesses (one of them requiring a repeat laparotomy) and three (23%) abdominal wall abscesses. Patients were followed up for a median of 13 years, during which they experienced no complications, save for one that had intestinal obstruction due to adhesions that required laparotomy.

The clinical picture of appendicitis in an infant or toddler is characterised by classical symptoms (nonspecific or latent) as well as diarrhoea and abdominal distension. In cases of suspected intra-abdominal infection in infants and toddlers, omphalitis (especially in cases with associated umbilical hernia, due to contiguity) may be a sign of peritonitis.<sup>6</sup> These patients may also develop a reactive hydrocele or pyocele. The diagnosis is delayed, hindered by the usual nonspecificity of the manifestations, moderate leukocytosis and paucity of ultrasound findings.<sup>3–6</sup> Computed tomography may be useful in cases in which the diagnosis is elusive. This explains why five of the patients in our series were admitted with initial diagnoses other than appendicitis. Most patients will be present with advanced

forms of disease (gangrenous or perforated appendicitis, appendiceal masses).<sup>1–6</sup> Due to the difficulty in diagnosing appendicitis in patients aged less than 2 years, the probability of intestinal perforation at the time of diagnosis ranges between 30% and 65%.<sup>5</sup> The prescribed antibiotic therapy should cover, as is customary, gram-negative (taking into account the frequent presence of *P. aeruginosa* [43%]) and anaerobic bacteria. We ought to highlight that the rate of early complications is high: 38% of patients in our series (5/13) developed abdominal wall or intra-abdominal abscesses. Intra-abdominal abscesses may be treated conservatively as a first approach with the administration of a broad-spectrum antibiotic (usually imipenem), which may resolve the abscess without percutaneous drainage or a new laparotomy, and the latter was only required by one of the patients in our series. In this young age group, appendicitis is not associated in the long term with the future development of other diseases in the gastrointestinal tract or other systems, nor with a higher rate of developmental disorders.<sup>4–6</sup>

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