Post-traumatic retrocaecal appendicitis

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Abstract

Introduction
Blunt abdominal trauma (BAT) leading to appendicitis is rare. This can be challenging for diagnosis. The aim of this study was to investigate appendicitis occurring after BAT.

Materials and methods
A three-year study was performed to investigate appendicitis developing after BAT.

Results
A total of 8 patients were studied. All had isolated post-traumatic appendicitis without any other associated abdominal injury. Retrocaecal position was observed in all; one patient had perforated appendicitis and one had an appendicular lump. Fecalith was present in 5 patients. Grossly, all patients had features of appendicitis.

Conclusion
BAT leading to appendicitis is rare. Retrocaecal position of the appendix is commonly affected.

Introduction
Appendicitis is the most common cause of surgical emergency. Acute appendicitis following blunt abdominal trauma (BAT) is rare. The role of BAT is still uncertain in the aetiology of appendicitis. Uncomplicated or complicated appendicitis may occur after BAT. Luminal obstruction, increased pressure impairing blood circulation in the mesoappendix and the appendix being compressed against the ileum, leading to an acute inflammatory response, have been suggested as the likely mechanisms of post-traumatic appendicitis. Clinical features of appendicitis after BAT are same as that of non-traumatic appendicitis. A high clinical suspicion with serial clinical and radiological assessment may be helpful in diagnosis. A consideration of post-traumatic appendicitis following BAT has medical as well as potential legal implications. Our aim was to investigate appendicitis occurring after BAT.

Materials and Methods
This work conforms to the values laid down in the Declaration of Helsinki (1964). The protocol of this study has been approved by the relevant ethical committee related to the institution, in which the study was performed. All patients gave full informed consent to participate in this study.

This prospective study was performed at Sheri-Kashmir Institute of Medical Sciences for 3 years (from 2008 to 2011). Patients who had suspected appendicitis following a BAT were studied.

Results
A total of 8 patients were studied. The youngest subject was a 9-year-old boy and the oldest subject was a 63-year-old female. All patients had an isolated blunt abdominal wall trauma without any associated abdominal injury. Three patients had a fall, four had been kicked in the abdomen and one had a compression by the handle bar of a bike on the right lower abdomen. Occurrence of trauma and diagnosis of appendicitis was done within 24 h to 4 days. Two patients were retrospectively diagnosed of BAT before diagnosis of appendicitis, and two had a history of suspected appendicitis. In all 8 patients, abdominal pain was the leading symptom and tenderness in the right lower abdomen was a prime sign. Clinical suspicion, signs and symptoms of appendicitis, serial ultrasonography and computed tomography of abdomen were used for diagnosis. No other intrabdominal or extrabdominal visceral injury was observed. Mesoappendicular hemato ma was observed in two cases. All patients had retrocaecal appendix in position. Grossly, all had features of appendicitis. Fecalith were present in 5 patients. The 65-year-old female patient had a perforated appendix due to falling from the stairs. An appendicular lump was observed in a 34-year-old female who had an interval appendectomy. Histopathology confirmed diagnosis of appendicitis in all cases.

Discussion
Occurrence of appendicitis after BAT is a rare event. Trauma has been proposed as a cause of acute appendicitis, but there are doubts as to whether this is a casual or causal relation. The clinical characteristics, operative findings, statistically significant high incidence rate and literature review suggests the possibility of a causative relationship between appendicitis and BAT. Crush injury, a fall on bicycle handlebars and seat belt compression after road-traffic accidents have all been implicated in traumatic appendicitis. Diagnosis of appendicitis was made following a right-sided water impact during cliff-diving, suggesting the role of trauma.

Time period for appearance of characteristics of appendicitis after having blunt trauma abdomen is variable, ranging from 24 h to 96 h. The predominant symptom is abdominal pain. Other signs and symptoms of anorexia, nausea and vomiting could be seen as in typical non-traumatic appendicitis. Perforation of appendix could follow after BAT.

It is likely that retrocaecal appendix could be the most common reason for having traumatic appendicitis, because it is the most common position. Positions other than the...
Retrocaecal appendix are least likely to suffer from blunt abdominal wall trauma because of the intervening small gut. Trauma may be a contributing factor in causing acute appendicitis in a previously diseased appendix.\textsuperscript{10,11}

Vermiform appendix is itself a deep seated viscera, and trauma having a direct effect on it is not permissible. Various mechanisms exist and have been put forward for possible explanation. In this study, all patients had a history of BAT on the right lower abdomen. Ecchymosis and tenderness at the site of trauma on the right lower abdominal wall may be misleading symptoms, often attributed to soft tissue injury and delayed diagnosis. The traumatic force leading to appendicitis must be blunt and violent in nature, direct to the abdomen and should merge into symptoms of appendicitis requiring intervention.\textsuperscript{12} Transmission of force of impact on the abdominal wall via the small cross-sectional area increases the occurrence of appendicitis after blunt trauma. Variations in transmitted traumatic pulsations with altered media of abdominal wall, fat, muscle, caecal wall thickness and amount of gas-fluid in caecal content of faeces could alter direction and intensity of waveform, which could have an impact on vascularity of appendix or lead to luminal obstruction.

Haematoma or oedema of the appendiceal wall with consequent luminal obstruction has been proposed as initiating the pathophysiological event in the development of post-traumatic acute appendicitis.\textsuperscript{8} Luminal obstruction may occur by displacement of stool. Inflamed appendix with contusion as well as punctuated bleeding sites of the caecum is suggestive of traumatic appendicitis;\textsuperscript{13} oedema with haematoma of appendix along with bruising and rupture of the mesoappendix could be observed in post-traumatic appendicitis.\textsuperscript{8} Enlarged mesenteric nodes, mesenteric disruption or haematoma in the ileocaecal area may be the indirect mechanisms contributing to inflammatory response in post-traumatic retrocaecal appendicitis. Occurrence of fecalith is twice as common in traumatic appendicitis than in the non-traumatic type, which has been suggested in the aetiology of post-traumatic appendicitis.\textsuperscript{14,15} Localized perforation of vermiform appendix following BAT is due to increased pressure on the colonic wall tension; this has been explained by the Laplace’s theory.\textsuperscript{7}

With dismal findings on clinical examination and FAST, these remain unpredictable at initial evaluation. General physical examination of abdominal sonography and computed tomography is to be repeated for diagnosis of traumatic appendicitis. Although having appendicitis following BAT is rare, predicting the event which will lead to appendicitis is difficult and is a very rare phenomenon. Delay between diagnosis and successive BAT is associated with more adhesions.

**Conclusion**

BAT leading to appendicitis is rare. Retrocaecal position of the appendix is commonly affected.

**References**