**Linked commentary- Prospective, multicentre validation of appendicitis risk prediction models in children presenting with right iliac fossa pain**

*Can risk stratification help reduce negative appendectomy rates?*

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Word count 739

The accurate prediction of which children presenting with abdominal pain have appendicitis is challenging. The classical history of localising right iliac fossa pain may be absent, whilst basic investigations may not be helpful. Normal appendicectomy rates (NAR) can be as high as 15-25%, with these children undergoing an operative procedure and general anaesthetic with no real therapeutic gain [1]. In the United States of America many children will undergo a CT scan as part of the diagnostic work-up, reducing NAR but exposing children to significant doses of radiation [1]. In the United Kingdom surgeons typically utilise ultrasound to aid with diagnostic work up, a tool that can be extremely useful when used by a trained and experienced operator but can return indeterminate results in up to 50% of cases [2]. CT scans were used in less than 1% of the British children reported in this study [3].

In this issue Nepogodiev and colleagues report the outcome of 1800 children presenting with suspected appendicitis, of which 630 underwent appendicectomy and 530 had confirmed appendicitis. They apply a number of prediction tools identified through structured literature review and conclude that the Shera score (table 1) as the best performing to identify patients not requiring an operative procedure [3]. The Shera score largely reflects clinical acumen through incorporation of important features in the history and precise clinical signs whilst omitting less specific features. A low score (≤3 for children aged 5-10 and females aged 11-15, and ≤2 for males aged 11-15) reflects there being few of the clinical features present in the child and the data from this paper may increase clinician confidence in not proceeding to appendectomy in such cases. This score was able to identify patients at low-risk of acute appendicitis, reflected by a sensitivity of 96.3% [4]. Medium-High Shera scores (>3 in children aged 5-10 years and females aged 11-15, and >2 in males aged 11-15) were less helpful, reflected by a low specificity of 44.3% and low positive predictive value (PPV) of 41.4%. Interestingly Nepogodiev *et al* discuss 26 other scoring mechanisms used for risk stratification and identification of children with appendicitis, 15 of which are based on clinical/blood result data only and many of which were similar in terms of specificity/PPV.

This study reaffirms the difficulties in diagnosis of appendicitis and reinforces the importance of good history taking, examination and the best interpretation of basic observations investigations. The United Kingdom has one of the highest NAR in the world, and the question of utilising CT to accurately image and reduce the need for an operation is controversial [3]. The balance of risk is complex, weighing radiation dose against an unneeded operation and general anaesthetic.

Utilisation of risk scores to stratify patients is not novel, with well established tools for diagnosis and disease severity, such as the FeverPain score for bacterial pharyngitis [5] and surgical decision making tools are also widely available and can be used for stratification of disease severity to aid with, for example, operative planning [6]. Whilst risk scores have potential benefits their clinical translation is frequently underutilised in comparison to clinical experience or suspicion particularly as many although reliable are not sufficiently robust to be clinical decision tools but also clinicians will override the prediction model based on their clinical expertise and confidence.

Looking forward, the potential to obtain and work with ‘big data’ will likely usher in a new generation of scoring systems for a multitude of conditions, in an attempt to improve clinical assessment and personalise therapy. Despite this, there remains an inescapable role for clinical acumen in diagnosis of acute conditions requiring urgent treatment. Over coming years it will be interesting to observe the application of artificial intelligence through supervised machine learning techniques to diagnosis and manage acute presentations, employing evidence collated from multiple sources undergoing constant refinement. Employing methods to classify diagnostically uncertain patients through mathematical metrics, such as a Bayesian posterior probability (a metric to assign likelihood of an event based on additional data), may help with decision making in individual cases [7]. It remains to be seen whether these classifiers will be widely adopted in preference to ‘clinical judgement’.

This study confirms risk scoring mechanisms are useful for low vs high risk stratification of patients presenting with right iliac fossa pain. The Shera score may be used an adjunct to surgical clinical acumen in order to reduce unneeded operations whilst providing surgery to the children who need it.

***Table 1- Constituent parameters and relative weightings of the Shera score, adapted from Shera et al*** [4]

|  |  |
| --- | --- |
| **Variable** | **Score if present** |
| Migratory RIF Pain | 1 |
| Nausea/Emesis | 1 |
| Anorexia | 1 |
| Tenderness RIF | 2 |
| Pyrexia | 1 |
| Tenderness RIF on Cough/Percussion/Hopping | 2 |
| Leucocytosis | 1 |
| Neutrophilia | 1 |

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