clinical relevance of adult intussusception on CT imaging; a benign entity or surgical emergency?

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Aims and objectives

The detection of intussusception is increasing both with technological advancements in multi-detector CT and with its increasing use in abdominal imaging.

In particular, there have been increasing numbers of non-lead point intussusceptions that may be transient and therefore not require surgical intervention [1]. Determining the clinical significance of such a finding can be a diagnostic challenge.

Intussusception has a classic bowel within bowel appearance on CT with invagination of a segment of the gastrointestinal tract (intussusceptum) into an adjacent segment (intussuscipiens). The mesentery and mesenteric vessels are also invaginated giving a multi-layered appearance [2].

Further findings on imaging such as the identification of a lead-point, the location and length of the intussusception and associated complications such as ischaemia or obstruction may aid in the differentiation of intussusception requiring urgent surgical intervention and transient, incidental intussusception. This may guide surgical management with the possibility of reducing unnecessary surgery and its associated complications.

Therefore, the primary aims of this study were to identify how often a lead point was accurately identified on CT using operative and pathological findings as a reference standard and to assess the incidence of incidental intussusception without lead point.

The secondary aims were to assess whether we can predict these non-surgical intussusceptions based on CT characteristics.
Methods and materials

A search of our picture archiving and communication system (PACS) records of CT reports on adults (18 or older) within Greater Glasgow and Clyde health board revealed 202 patients with intussusception included in the report over a 4 year period from January 2014 to December 2017. These were retrospectively identified using a combination of key word search of CT reports and image review. On subsequent image analysis, 177 of these cases had imaging appearances consistent with intussusception.

The multiplanar images were reviewed and imaging characteristics were documented including the location and length of the intussusception and complications identified such as ischaemia or obstruction. Medical records were analysed to determine symptoms at the time of imaging, follow up or further investigation, surgical intervention and clinical outcome. Operative and pathological findings from electronic clinical records were used as a reference standard for those undergoing surgery and follow up imaging findings including interval CT abdomen and pelvis, CT enterography or small bowel MRI as well as clinical review records and endoscopy findings for those who were managed expectantly.
Results

The total number of CT scans of the abdomen and pelvis performed within the Greater Glasgow and Clyde Health Board over the 4 year period analysed was 65,393 giving an overall incidence of intussusception of under 0.3%, comparable to that documented in the literature [3,4,5]. Overall, the majority were enteroenteric 91/177 (51%), followed by colocolic 53/177 (30%) and ileocolic 30/177 (17%), Table 1.

Of the 177 intussusceptions identified on CT, a lead point was identified in 67/177 (38%). There was no lead point in 110 (62%), Figure 1. Identified lead points in our cohort include colorectal cancer (Figure 2), adenomatous polyps, Meckel's diverticulum, intramural lipoma (Figure 3) and mesenteric lymph nodes. Another interesting case involved a long segment intussusception in a young patient with cystic fibrosis (Figure 4).

Of those with a lead point on CT, 33/67 (49%) proceeded to surgery whilst 34 (51%) were managed conservatively. Indications for conservative management were that the patient was deemed unfit for surgery, further treatment was declined by the patient, the patient died or in only 1 case, that the intussusception was not believed to be the cause of their symptoms. In the surgical group, the positive predictive value (PPV) of CT was 97% with 32/33 patients having lead points confirmed whilst only 1(3%) did not (Figure 5).

In the group where no lead point could be visualised on CT, 83/110 (75%) were managed expectantly and 27 (25%) proceeded to operation (Figure 6). Of those taken to theatre, 17/27 (63%) had a lead point demonstrated intra-operatively or on pathology whilst 10 cases had no lead point giving a negative predictive value (NPV) of 37% (Figure 7).

In the subgroup with no CT identified lead point and who did not undergo surgery, 70/83 (84%) were deemed incidental based on imaging (Figure 8) and received clinical follow up alone; while the remainder either refused further intervention or were deemed for palliative care and therefore not investigated further or died of other causes.

On further analysis, the PPV was 100% in the non-surgical group with no obstruction, ischaemia or lead-point on CT. The majority of these were entero-enteric, 67/83 (81%).

Overall, the sensitivity of CT in predicting lead-point intussusception was 65% with a specificity of 90%.
Table 1: Location of Intussusception

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Cases</th>
<th>Percentage of Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteroenteric</td>
<td>91</td>
<td>51</td>
</tr>
<tr>
<td>Colocolic</td>
<td>53</td>
<td>30</td>
</tr>
<tr>
<td>Ileocolic</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td>Gastric</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Rectal</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Location of Intussusception

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Fig. 1: CT Identification of a Lead Point

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**Fig. 2:** Coronal CT image shows a caecal cancer acting as a lead point for an ileocolic intussusception.

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Fig. 3: Axial CT image of a symptomatic patient showing an intramural lipoma of the transverse colon causing intussusception.

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Fig. 4: Axial CT image shows a long segment intussusception in a young patient with a history of cystic fibrosis.

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Results - Lead point

Fig. 5: Management where CT identified a lead point.

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Fig. 6: Management of patients where no lead point was identified on CT imaging.

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Fig. 7: Operative findings in those with no CT identified lead point.

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Fig. 8: Axial CT image showing an enteroenteric intussusception in an asymptomatic patient, deemed incidental and managed with clinical follow up.

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Conclusion

Intussusception in adults was a rare finding in our study however, contrary to the findings of some previous reports [4], management need not always be surgical and adult intussusception was not associated with a lead point in the majority of cases.

However, CT was specific at predicting lead-point intussusception with a high positive predictive value in those requiring surgery and it is therefore a useful diagnostic tool and an accurate predictor of patients who would benefit from surgery.

In our study, the majority of intussusceptions were enteroenetic (51%), a finding supported in the literature [6]. A significant number of CT identified intussusceptions were deemed incidental and managed conservatively with follow up imaging or clinical review confirming resolution. These were more likely to be entero-enteric with no features on CT to suggest lead-point, obstruction or ischaemia. The PPV in this subgroup was 100%. Along with clinical review therefore, we conclude that these CT characteristics can be used to accurately identify a cohort of likely transient and incidental intussusceptions that do not require an operation therefore avoiding unnecessary surgery.
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References


