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Case Report

Successful preoperative identification of fish bone causing appendicitis using 3-dimensional multidetector-CT[☆]

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ABSTRACT

A 79 years male with fishbone-induced acute appendicitis was treated surgically with laparoscopic procedure. In preoperative diagnostic study, 3-dimensional multidetector-computed tomography (3D-MDCT) demonstrated the foreign body in the appendix and 3D-reconstructed images seemed fishbone with sharp-pointed dorsal fin directing to the tip of the appendix. With these findings, surgical indication of appendectomy was confirmed and laparoscopic appendectomy was performed. He made a full recovery and was discharged in a satisfactory condition following 7 days of post-operative treatment. From this case experience, 3D-MDCT seems helpful to visualize details of foreign bodies in the appendix, and valuable to confirm surgical indication of complicated acute appendicitis.

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Case report

1 A 79 years old male was transferred from another outpatient-
 2 clinic. His first complains was peri-umbilical pain for 6 hours
 3 and pain was migrating to right lower quadrant (RLQ) without
 4 nausea or vomiting. On visiting to our hospital, his temper-
 5 ature was 38.3 °C, blood pressure was 184/113 mmHg, heart
 6 rate was 103 beats per minutes. On examination, he showed
 7 abdominal pain, rebound tenderness at RLQ, and positive

Blumberg's sign. The laboratory workup demonstrated a
 white blood cell of 11,390 (count/ mm³), neutrophile of 86%,
 and C-reactive protein of 1.63 (mg/dL). The Alvarado score
 [1] counted 8 point which was equivalent to high possibility of
 acute appendicitis (Table 1). The plain abdominal CT showed
 a calcified density within the appendix with surrounding
 inflammation (Fig. 1). To diagnose a complicated appendicitis
 with gangrenous, perforation or stercolith, 3-dimensional
 reconstruction of MDCT (3D-MDCT) imaging was added, and
 it visualized a sharp-pointed calcification foreign body in the

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Table 1 – The Alvarado score of this case. The Alvarado score of this case counted 8 point which was equivalent to the high possibility of acute appendicitis [1].

	Mnemonic	Finding	point
Symptoms	M	Migration	1
	A	Anorexia-acetone	0
	N	Nausea-vomiting	0
Signs	T	Tenderness in right lower quadrant	2
	R	Rebound pain	1
	E	Elevation of temperature (body temperature $\geq 38.3^{\circ}\text{C}$)	1
Laboratory	L	Leukocytosis (white blood cell $\geq 10,000/\text{mm}^3$)	2
	S	Shift to the left (neutrophile $\geq 75\%$)	1
Total score			8

The possibility of acute appendicitis in Alvarado score: total score ≥ 7 : high, 5,6: medium, ≤ 4 : low.

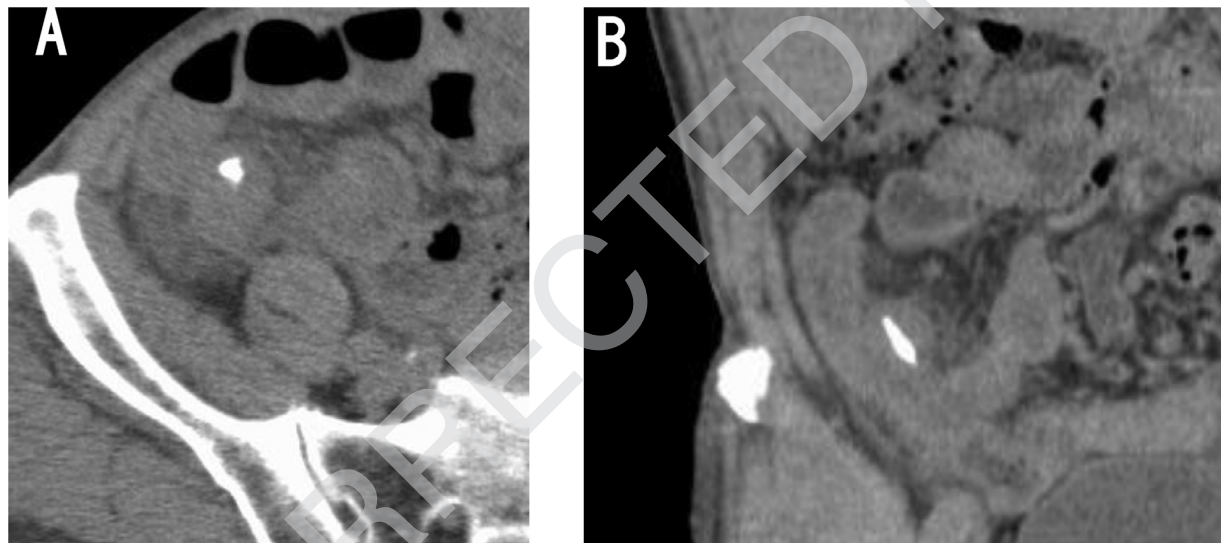


Fig. 1 – The plain abdominal computed tomography (CT) images. A calcified density within the appendix with surrounding inflammation was observed in his right lower quadrant. Its sharp-pointed edge directed to left lower direction. (A) axial section, (B) coronal section.

appendix. Its detailed shape in 3D-MDCT had sharp-pointed 2 wings (Fig. 2). Synthesizing images of 3C-MDCT (Fig. 2) with 2-dimensional plane CT (Fig. 1), a calcified body had a sharp-pointed 2 wings directing to the tip of the appendix, and it was supposed a fishbone when compared with figures of fishbone atlas. Combining these, it seemed to be unable for 2 wings of to slide out from appendix spontaneously as its shape, location, and direction of wings and less-peristaltic appendiceal nature. Based on these findings, he was diagnosed with fishbone-induced complicated acute appendicitis, and followed by an urgent laparoscopic appendectomy in which entire appendix was removed.

The surgical material demonstrated a fishbone with sharp-pointed 2 wings directed to the tip of the appendix (Fig. 3). The fishbone-attached wall of the appendix seemed gangrenous with pending perforation. Histologic findings were consistent with gangrenous appendicitis with no malignancy.

He made a full recovery and was discharged in a satisfactory condition following 7 days of post-operative treatment.

During his hospitalization, we could not get information about the date he ingested it although he gave us his likelihood of eating fish involving fishbone, and we could not identify which species fishbone's fish is because ingested fishbone seemed very similar among fishes to eat.

Discussion

The incidence of foreign bodies in the appendix has been reported in 0.005%-0.113% [2]. An acute appendicitis is treated by 2 different strategies according to appendiceal comorbidities, uncomplicated or complicated. The latter consists of gangrenous, perforated, or abscess formation, and treated with surgical appendectomy [3]. In presented case, preoperative identification of fishbone was possible by additional reconstructed 3-dimensional MDCT imaging. This modality enabled to visualize its location, direction, and meticulous shape and of ingested fishbone in the appendix. Moreover, this fishbone

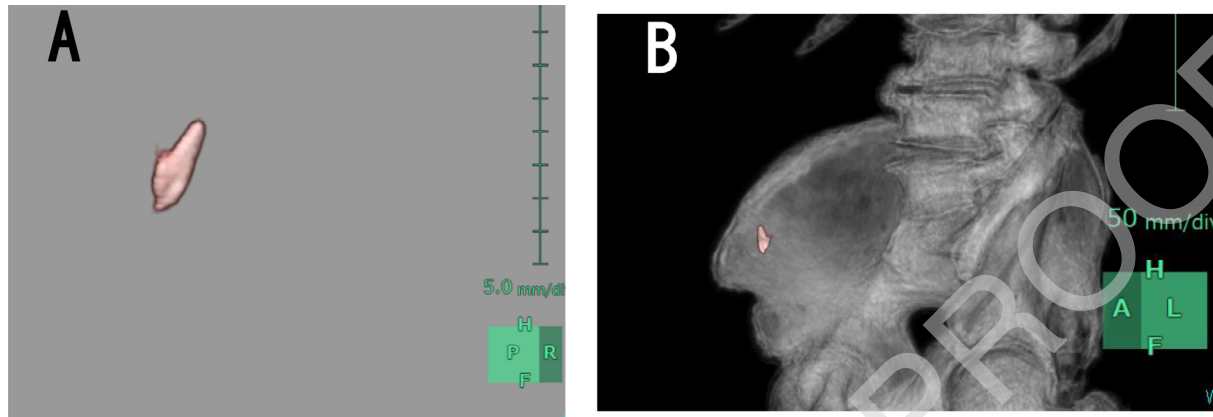


Fig. 2 – The 3-dimensional multidetector-computed tomography (MDCT) images. The calcified foreign body seemed to have sharp-pointed 2 wings. (A) Fishbone 3D-image in posterior view, with ruler and direction instruction, (B) Fishbone in 3D-reconstructed MDCT image. Synthesizing 3D-images taken with 3C-MDCT to 2-dimensional plane images (Fig. 1), a calcified body had a sharp-pointed 2 wings directing to the tip of the appendix.



Fig. 3 – The photography of fishbone embedded in the removed appendix. The fishbone has sharp-pointed 2 wings with ruler. Fishbone sized 15 mm in length and 8 mm in height.

was suspected dorsal fin of fish when compared with fish-bone anatomy diagram, preoperatively. These foreign body's anatomic information is available not in plane axial, coronal, or sagittal viewing but in 3D-MDCT. Unless this information, it is not concluded what is a calcified foreign body with or without pointed edge, and whether it is embedded or possibility of moving out from appendix. The published case report of fishbone-appendicitis reported that abdominal radiography is not reliable in finding the fishbone [4]. To our best knowledge, our case presentation of fishbone-induced acute appendicitis is the first to visualize fishbone in the appendix to worth reporting.

Conclusion

A 79 years male with fishbone-induced acute appendicitis was treated surgically using laparoscopic procedure. 3D-MDCT seems helpful to visualize details of foreign bodies in the appendix and valuable to confirm surgical indication of complicated acute appendicitis.

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REFERENCES

- [1] Alvarado A. A practical score for the early diagnosis of acute appendicitis. *Ann Emerg Med* 1986;15(5):557-64. doi:10.1016/s0196-0644(86)80993-3. 71
- [2] Bababekoov YJ, Stanelle EJ, Abujudeh HH, Kaafarani HM. Fishbone-induced appendicitis. *BMJ Case Rep* 2015;2015:bcr2015209562. 72
- [3] Vons C, Barry C, Maitre S, Pautrat K, Leconte M, Costaglioli B, et al. Amoxicillin plus clavulanic acid versus appendicectomy for treatment of acute uncomplicated appendicitis: an open-label, non-inferiority, randomized controlled trial. *Lancet* 2011;377(7):1573-9. 73
- [4] Harhar M, Jabi R, Harroudi TE, Bouziane M. Fishbone-induced appendicitis: a case report. *Cureus* 2021;13(5):e15003. doi:10.7759/cureus.15003. 74