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# Heterotopic calcification after endoscopic retromuscular ventral hernia repair: A case report

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## Abstract

We present the case of a 50-year-old male patient with a subxiphoidal painful induration six months after endoscopic retromuscular mesh repair by means of an endoscopic mini- or less-open sublay operation. Investigations revealed a heterotopic ossification (HO) with dimensions 46 mm × 85 mm deep to the anterior fascia. After the failure of conservative treatment, a surgical excision was performed. The postoperative course was uneventful. In this article, we discuss the existing literature on HOs of the abdominal wall and provide an overview of therapeutic options.

## Keywords:

Heterotopic calcification, heterotopic ossification, myositis ossificans, retromuscular mesh repair, umbilical hernia

## Introduction

Heterotopic ossification (HO) is an umbrella term for calcifications arising in extra-osseous tissues such as muscle (i.e., myositis ossificans), fascia (i.e., fasciitis ossificans), tendons, and fatty tissue. The etiology is still not entirely clear. It is hypothesized that tissue injury causes aberrant differentiation of fibroblasts into osteogenic cells due to the activation of a local inflammatory cascade.<sup>[1]</sup> HO is most reported after total hip arthroplasty. Other risk factors include fractures, burns, spinal cord injuries, and traumatic brain injuries. Progressive osseous heteroplasia is a hereditary form of HO.<sup>[1]</sup>

## Case Presentation

We present the case of a 50-year-old male patient who presented at our outpatient abdominal surgery clinic. He had a body mass index of 30.7 and no significant past medical history. The patient presented with an umbilical hernia and concomitant rectus diastasis for which an elective surgical

repair was scheduled. We performed an endoscopic retromuscular mesh repair with the placement of a 36 × 15 cm Marlex mesh and rectus alignment by means of an endoscopic mini- or less-open sublay operation. Both the procedure and the postoperative course were uneventful with discharge home on postoperative day 1.

At six months postoperatively, the patient presented with a painful nodule in the subcostal region. He had continuous pain at the location, exacerbated by movement and local pressure. He reported no disposition to keloid formation. A computed tomography (CT) revealed heterotopic calcifications (dimensions 4.6 × 8.5 cm, with 1.5 cm of thickness) caudally of the xiphoid process [Figure 1A–C]. We note that the xiphoid was not disrupted during our initial operation. A treatment course of anti-inflammatory agents [nonsteroidal anti-inflammatory drugs (NSAID)] for six weeks proved to be ineffective, with an increase of pain and induration. At 11 months postoperatively, we performed surgical excision of the lesion.

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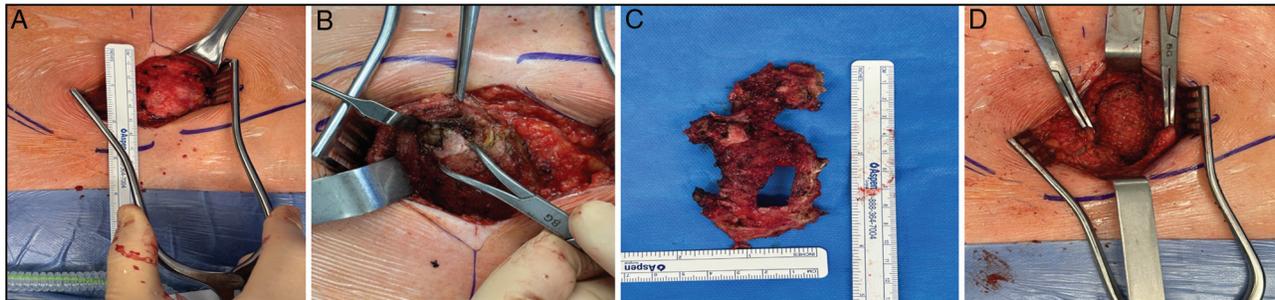
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**Figure 1:** A: Computed tomography (CT) image in sagittal view of the ossification caudally to the sternum (green arrow). B: CT image in coronal view of the ossification caudally to the sternum (green circle). C: 3D reconstruction of the ossification caudally to the sternum



**Figure 2:** A: Per-operative view of incision over the lesion. Margins of the palpable lesion are marked in blue. B: Per-operative view. The ossification is dissected free from the overlying fascia. C: Fully excised ossification measuring 8 × 5 cm. D: Per-operative view. Placement of a lightweight mesh behind the anterior fascia

The surgery was started with a vertical 5 cm incision over the palpable lesion [Figure 2A]. The anterior fascia was opened and dissected free from the underlying calcification [Figure 2B]. The mass could be removed in its entirety, measuring 8 × 5 cm [Figure 2C]. There were no remaining palpable calcifications, and the underlying mesh and abdominal wall appeared to be intact. As a precaution, we subsequently placed a lightweight mesh behind the anterior fascia to further reinforce the incised abdominal wall [Figure 2D]. The anterior fascia was closed again. A suction drain was left in the subcutaneous space. The immediate postoperative course was uneventful. The patient could be discharged home on day 3 after normalization of the drainage volumes. The patient reported some pain at the follow-up consultation three months postoperatively, but without any impact on daily activities. A follow-up CT scan showed minor calcification recurrence [Figure 3].

## Discussion

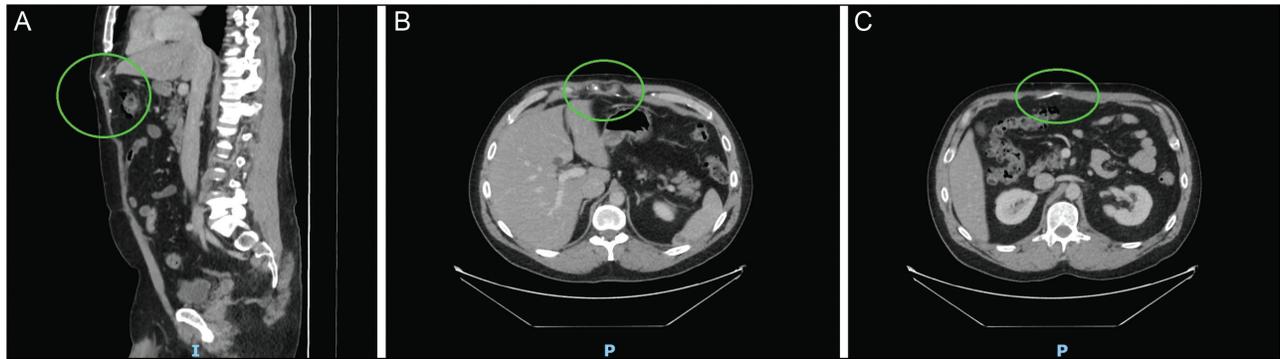
HOs of the abdominal wall are mostly reported after abdominal trauma (e.g., traumatic explorative laparotomy and penetrating trauma) and are often linked to vertical laparotomy incisions, mostly located in upper midline incisions.

The underlying pathophysiology for this remains to be eluded. It is hypothesized that pluripotent mesenchymal cells within the linea alba undergo

metaplasia, differentiate into osteoblasts, and ultimately contribute to the formation of bony deposits.<sup>[1]</sup> It is difficult to estimate the total incidence of abdominal wall ossifications. Kim *et al.*<sup>[2]</sup> reported an incidence of HO as high as 25% after laparotomy based on CT findings of 152 patients. Dimensions of calcifications ranged between 0.2–1.7 cm axially and 0.5–8.5 cm craniocaudally.<sup>[2]</sup> The presence of clinical symptoms was not reported; thus, the incidence of symptomatic abdominal HO may be much lower. We found only five cases of HO following hernia repair in existing literature.<sup>[3-7]</sup>

Prophylactic treatment options of HO consist of NSAIDs, glucocorticoids, bisphosphonates, and extracorporeal shock wave therapy (ESWT).<sup>[8,9]</sup> NSAIDs are believed to suppress prostaglandins and, therefore, inhibit osteogenesis differentiation of progenitor cells. Indomethacin 25 mg three times daily is most commonly used; however, no evidence exists for superiority to other treatment regimens. Our patient received an ibuprofen treatment of 600 mg three times daily for six weeks in an attempt for symptom and disease progression control. After surgical excision, he received an ibuprofen treatment of 600 mg twice daily for one week.

Indomethacin is not available in our country. Glucocorticoids and bisphosphonates are generally not preferred given their extensive side effect profile.<sup>[9]</sup>



**Figure 3:** (A) Computed tomography (CT) image in sagittal view of the remaining ossifications at three months postoperatively (green circle). (B) CT image in axial view of the cranial ossification at three months postoperatively (green circle). (C) CT image in axial view of the caudal ossification at three months postoperatively (green circle)

Several reports have been published illustrating the successful use of ESWT in reducing pain and increasing mobility in patients with neurogenic HO (e.g., after spinal cord and traumatic brain injuries). In one case, a size reduction in bilateral hip ossifications was observed.<sup>[2]</sup> For now, there are no reports of the use of ESWT for abdominal ossifications, and it was not attempted in our case given the lack of literature. None of the other case reports proposed or utilized noninvasive treatment for managing the calcifications.

Surgical excision is the approach of choice after failure of conservative treatment.<sup>[9]</sup> It is believed that ossification maturation ends at six months, and therefore, surgical excision should be delayed until then to prevent recurrence.<sup>[1]</sup>

In our patient, the ectopic bone formation was completely excised after 11 months, consistent with other cases where ossifications were removed within a year after their primary surgery.<sup>[4,5]</sup> There is insufficient evidence to support the use of radiotherapy as primary treatment.

## Conclusion

HOs are a common finding in patients after orthopedic and trauma surgery. The underlying pathophysiology remains to be eluded; however, multiple viable theories exist. HO after elective abdominal wall surgery with mesh repair is, however, rare. With only five other published cases, this is the first of its kind discussing possible invasive and noninvasive treatment options.

## Author contributions

KDP was the lead surgeon on both surgeries. AB was the first assistant during both surgeries. AB and AV were involved in drafting the manuscript and performing a critical literature review. All authors were equally involved in proof-reading and editing of the manuscript.

## Ethical policy and institutional review board statement

Approval of the local ethics committee (Ethics committee AZ Herentals) was granted with approval number OG 150 on February 11, 2025. All procedures followed were in accordance with the Helsinki Declaration of 1975 for medical research involving human participants, including research using identifiable human material or data.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Data availability statement

Data sharing is not applicable as no datasets were generated. Additional information can be requested by contacting the corresponding author.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

## Acknowledgments

Not applicable.

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