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Omphaloliths: a case series and review of 29 cases in literature

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Abstract

Omphaloliths are uncommon benign umbilical lesions caused by the accumulation of sebum and keratin into a stone-like concretion. Recognition of this entity can prevent unnecessary procedures and imaging studies for uncomplicated cases. We present three cases of omphaloliths from our department and review all 26 cases previously reported in the English literature with regard to modes of presentation, potential risk factors, complications, and treatment options to guide clinicians. The mean age at presentation was 48 years. Of the 29 cases, 17 (59%) were asymptomatic. Male patients presented at a younger age and were more likely to present with complications compared to females who presented at an older age with asymptomatic lesions ($P=0.006$). Features of patients described included dementia, hirsutism, a deep or narrow umbilicus, multiple nevi, obesity, and poor hygiene. Two patients developed overlying pyogenic granulomas. Removal of asymptomatic lesions was uncomplicated and done using forceps or following irrigation, with no recurrence. Complications, including localized abscesses and peritonitis, were associated in 41% of patients who were treated surgically; recurrence was noted in one patient. Removal of omphaloliths is recommended, once identified, to reduce risks of complications and patients should be encouraged to improve their personal hygiene.

Keywords: keratin, omphalolith, umbilical mass, umbilical concretion, umbolith

Introduction

The word omphalolith, derived from the Greek omphalos (navel) and lithos (stone), [1], describes an

uncommon benign entity characterized by the accumulation of sebum and keratin into a stone-like concretion in an umbilical cleft [2]. It is also known as Cullen umbilical concretion, inspissated umbilical bolus, omphalith, omphalokeratolith, and umbolith [3]. Although these are infrequently described in the medical literature, their existence has long been recognized as described by Dr. Thomas Cullen in 1916 and reported by Porter in 1920 [4]. It is likely that they are under reported.

Three patients presented to our clinics within a year with omphaloliths and the uncommon nature prompted us to evaluate the case reports to determine if there were shared clinical features that might provide guidance for modes of presentation, potential risk factors, complications, and treatment options.

Case series

The first patient (case 27 in [Table 1](#)) was a 65-year-old woman who presented with a four-year history of an asymptomatic dark lesion in her navel. She was otherwise well with no regular medication. Examination revealed a hard dark-brown hyperkeratotic protrusion from the umbilicus (**Figure 1A**). This was removed using forceps with gentle traction, which revealed a white, moist base (**Figure 1B**). Histology revealed a mass of laminated keratin. She was advised to improve umbilical hygiene. There was no recurrence noted.

The second patient (case 28 in [Table 1](#)) was a 51-year-old woman who presented with a benign nevus on her left cheek. She had no past medical history. On a full skin check, she was noted to have multiple benign nevi and an incidental asymptomatic dark



Figure 1. Omphalolith in Case 1 **A)** before, and **B)** after removal.

umbilical mass, which was also removed using forceps (**Figure 2**). Better umbilical hygiene was recommended.

The third patient (case 29 in [Table 1](#)) was a 60-year old woman with no previous medical history who was referred for an asymptomatic crusty lesion in her umbilicus, which was previously suspected to be a squamous cell carcinoma by her primary care doctor. A dark hyperkeratotic umbilical mass was found and removed using forceps revealing a moist malodorous base. She was advised to improve umbilical hygiene.

Methods

We searched PubMed, Cochrane database, MEDLINE,



Figure 2. Omphalolith in Case 2 **A)** before, and **B)** after removal.

and EMBASE for English language articles using the terms 'navel stone,' 'omphalith,' 'omphalokeratolith,' 'omphalolith,' 'umbilical concretion,' and 'umbolith.' We noted demographics, clinical features, risk factors, histopathology, associated diseases, complications, and treatments. Studies were excluded if they failed to describe individual cases and if they were not written in English.

The demographics and clinical features of the 26 published cases and our three cases are shown in [Tables 1-3](#). Statistical significance was assessed using the Fisher exact test with an a priori significance level of 0.05.

Results

Patient Characteristics

Age at presentation ranged from 16 to 96 years (mean 48 years). There were 17 females and 12 males. Male patients were significantly more likely to present at a younger age ($P=0.006$) and with complications such as umbilical pain and discharge compared to females who were more likely to present with asymptomatic lesions ($P=0.006$), ([Table 3](#)).

Fourteen cases were reported by physicians in the USA [3–11], five cases from India [12–14], our three cases from the UK, three cases from Japan [1, 15, 16], and single cases from Morocco [2], Qatar [17], UAE [18], and Saudi Arabia [19], ([Figure 3](#)).

Presentation

Of the 29 patients, 10 patients presented because of a pigmented umbilical mass, 11 patients presented

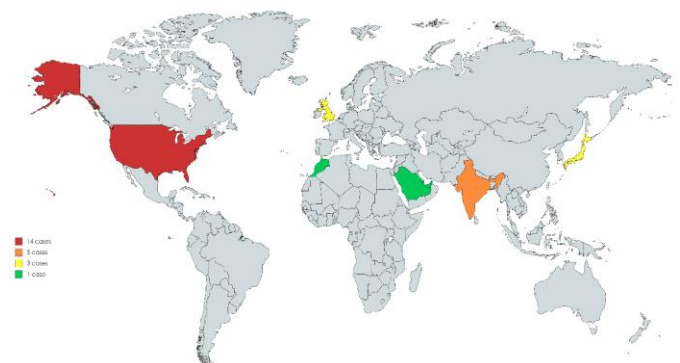


Figure 3. Geographical distribution of cases of omphaloliths reported in English literature.

for umbilical pain and/or discharge, and one patient presented with generalized abdominal pain. In 7 patients, omphaloliths were asymptomatic incidental findings on physical examination. Duration of the lesions ranged from one week to 29 years (average 6.8 years).

Associated features included dementia (N=2), [8, 9], hypertrichosis (N=1), [18], long umbilicus (N=1), [7], narrow umbilicus (N=2), [10], multiple nevi (N=2), [4], obesity (N=2), [3, 12], and poor hygiene (N=4), [1, 6]. Two patients developed an overlying pyogenic granuloma [10, 16].

Treatment

Asymptomatic lesions were treated by simple removal using forceps (N=9), [1, 6, 8, 19] or by removal after softening in glycerin, olive oil, or saline (N=4), [3, 5, 9, 15]. In a case from 1920 [4], one patient underwent an omphalectomy. There was no recurrence after removal of asymptomatic lesions.

Associated umbilical abscesses were examined under anesthetic and treated with excision [10], or incision and drainage [12, 14, 16]. One patient who presented with peritonitis had a laparoscopic examination, extraction of omphalolith, and subsequent omphalectomy [17].

Discussion

Corneocytes and sebum accumulate within the deep recess of an unclean umbilicus. Over time, through years of exposure and evaporation of moisture, this combination becomes compressed into a hard and compact stone-like bolus forming a pseudocomedone with firm attachment at the umbilical base. The surface of an omphalolith can appear dark brown or black owing to melanin and oxidized lipids [9]. Removal of an omphalolith reveals a white, moist, and potentially malodorous base [7]. No cases of pediatric patients have been described to our knowledge, likely related to the time required for the formation of a significant concretion. Small omphaloliths of less than a few millimeters in length are believed to be common worldwide, although there are few reported cases of masses greater than one cm in length [1].

Histopathology typically shows laminated keratin and stratified corneocytes interspersed with amorphous sebaceous material, terminal hair, and scattered bacterial collections [5, 17].

Asymptomatic omphaloliths may remain unnoticed for many years but may come to attention with umbilical discharge or pain if they develop pyogenic granulomas, foreign body accumulation, skin ulceration, abscess formation, or secondary infection [1, 16, 17].

Poor umbilical hygiene is considered a primary risk factor for omphaloliths [5]. Failure to clean a deep umbilical cleft can be related to obesity or a deeply invaginated umbilicus [3, 12]. Fishman [6] reported cases of omphaloliths in which patients avoided bathing to protect their 'bee hive hair' in the 1970s and to prevent xerosis exacerbating eczema. The superstition among elderly Japanese that cleansing of 'umbilical sesame' provokes abdominal pain may account for their incidence in Japan [1, 15, 16]. Other risk factors include dementia [8, 9] in which cognitive impairment and lack of self-care may allow omphalolith formation [20].

Awareness of the diagnosis of omphalolith is important and it should be differentiated from other benign conditions including dermatofibroma, foreign body, keloid, urachal sinus, umbilical cholesteatoma, and umbilical endometriosis [21–23]. Malignant mimics of omphaloliths include melanoma, primary umbilical malignancy, squamous cell carcinoma, and Sister Mary Joseph nodule [2, 7, 9, 23, 24].

Omphaloliths are diagnosed clinically through physical examination with gentle manipulation and removal with forceps and moistened swabs. Imaging such as transabdominal ultrasonogram (USS), MRI, and CT scan may be required for symptomatic, doubtful cases. Ultrasonogram shows a heterogeneous, hypoechoic mass underneath the umbilicus with no vascular flow on color Doppler imaging [9]. Computed tomographic imaging reveals a well-defined hyperdense focus within the umbilicus, which may be accompanied by abscess and subcutaneous edema in symptomatic patients. Magnetic resonance imaging typically shows a well-

defined signal void mass on both T1- and T2-weighted sequences with no contrast enhancement [24]. In rare cases, the diagnosis may be only apparent after surgical exploration of umbilicus [17].

Conclusion

Omphaloliths are uncommon umbilical concretions that are usually asymptomatic but have the potential to cause umbilical abscesses and in rare cases, peritonitis. Once identified, removal with forceps

using traction is recommended. The patient should be encouraged to improve their umbilical hygiene. Recognition of the entity is important to prevent unnecessary consultations, inpatient admissions, procedures, and imaging studies for uncomplicated cases.

Potential conflicts of interest

The authors declare no conflicts of interests.

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Table 1. Summary of case reports of patients with omphaloliths.

Case No	Country Reported	Presenting Complaint	Age (y)	Gender	Duration of lesion (y)	Associated Features	Examination	Histopathology	Treatment
1 [1]	Japan	AUM	84	F	0.02	PH	Grey-brown finger-like umbilical nodule	LK & amorphous material	RUF
2 [2]	Morocco	AUM	16	F	14	NS	Dry crusted black-brown umbilical nodule	LK	ROO
3 [3]	USA	IF	69	F	NS	Obesity	Black UM	LK & amorphous material	I&R (using glycerin and curette)
4 [4]	USA	AUM	62	F	0.25	Multiple nevi	Dark UM	NS	Omphactomy
5 [5]	USA	AUM	27	F	27	NS	Two dark keratotic tubular umbilical concretions	LK	I&R
6 [6]	USA	IF	20	F	NS	PH	Black hard smooth UM	NS	RUF
7 [6]	USA	IF	23	F	NS	PH	Dark brown hard UM	NS	RUF
8 [6]	USA	IF	84	F	NS	PH	Black hard UM	Pink lacy material	RUF
9 [7]	USA	AUM	65	M	NS	Long umbilicus	Subcutaneous hard periumbilical nodule	NS	ROO
10 [8]	USA	AUM	83	F	NS	Dementia	Brownish black dry umbilical nodule	LK	RUF
11 [9]	USA	AUM	85	F	NS	Dementia	Dark brown firm UM	NS	I&R (using saline)
12 [10]	USA	UPD	50	F	29	Narrow umbilicus	Firm indurated umbilicus, Bean shaped plug	NS	I&R
13 [10]	USA	UPD	24	F	23.5	Narrow umbilicus	Red umbilicus with purulent discharge	NS	I&D, Omphactomy
14 [10]	USA	UPD	42	M	0.03	Umbilical PG	Red swollen UM, umbilical concretion on drainage	NS	Irrigation, I&D
15 [10]	USA	UPD	26	M	7	NS	Red swollen umbilicus	NS	EUA, SEA
16 [11]	USA	UPD	18	M	5	NS	Periumbilical erythema, serosanguinous exudate, firm indurated	NS	ROO (cotton-tipped applicator)

							umbilical nodule		
17 [12]	India	UPD	50	F	0.17	Obesity	Hard periumbilical nodule, serosanguinous discharge	Chronic nonspecific inflammation	SEA (Spinal Anesthesia)
18 [15]	Japan	IF	96	F	NS	NS	Smooth periumbilical nodule, Navel stone protruding from umbilicus	Nodular tissue with LK and focal microcalcification	I&R (using sterilized olive oil)
19 [16]	Japan	UPD	26	M	0.04	Umbilical PG	Soft red umbilical nodule with purulent discharge overlying a firm white nodule	LK & PG	SEA (Local Anesthesia)
20 [17]	Qatar	Peritonitis	26	M	NS	NS	Perforated umbilicus, well-formed track into abdomen	Chronic inflammation (umbilicus), Intraabdominal keratin stones	Laparoscopic investigation, Extraction of keratin stones, Omphalectomy
21 [18]	UAE	UPD	32	M	0.04	Hirsutism	Periumbilical cellulitis, edema, bloody discharge, stony hard foreign body	NS	ROO, I&D
22 [24]	India	UPD	33	M	0.02	NS	Periumbilical induration	NS	NS
23 [24]	India	IF	40	M	NS	NS	NS	NS	NS
24 [13]	India	UPD	30	M	0.01	NS	Ill-defined periumbilical swelling overlying ivory white umbilical stone	NS	I&D (Spinal Anesthesia), ROO
25 [14]	India	UPD	28	M	0.04	NS	Dark brown firm mass protruding from umbilicus surrounded by erythema	LK, sebaceous material, terminal and vellus hairs, bacterial collections	I&D (Spinal Anesthesia)
26 [19]	Saudi Arabia	AUM	43	M	6	NS	Dark brown firm mass protruding from umbilicus	LK and hair	RUF
27 (our case)	UK	AUM	65	F	4	NS	Hard dark brown UM	LK	RUF

28 (our case)	UK	IF	51	F	NS	Multiple nevi	Hard dark brown UM	NS	RUF
29 (our case)	UK	AUM	60	F	NS	NS	Hard dark brown UM with overlying scale	NS	RUF

AUM, asymptomatic umbilical mass; EUA, examination under anaesthetic; I&D, incision and drainage of abscess; I&R, irrigation and removal; IF, incidental finding; LK, laminated keratin; NS, not stated; PG, pyogenic granuloma; PH, poor hygiene; ROO, removal of omphalolith; RUF, removal using forceps; SEA, surgical excision of abscess; UM, umbilical mass; UPD, umbilical pain and/or discharge.

Table 2. Summary of findings from case reports on patients with omphaloliths.

Demographic			
Age range, years	16–96 (mean 48)		
Duration of lesion prior to presentation, years	0.02-29 (mean 7)		
	Subgroup	No of patients, n	Percentage of cases
Gender	Female	17	59%
	Male	12	41%
Country Reported	USA	14	48%
	India	5	17%
	UK	3	10%
	Japan	3	10%
	Morocco	1	3%
	Qatar	1	3%
	Saudi Arabia	1	3%
	UAE	1	3%
Presentation	Incidental Finding	7	24%
	Infection/Inflammation	12	41%
	Dark Umbilical Mass	10	34%
Symptoms	Asymptomatic	17	59%
	Umbilical Pain Only	1	3%
	Umbilical Pain and Discharge	10	34%
	Peritonitis	1	3%
Associations	Dementia	2	7%
	Excess body hair	1	3%
	Multiple Nevi	2	7%
	Obesity	2	7%
	Poor hygiene	4	14%
	Long / narrow umbilicus	3	10%
	Pyogenic granuloma	2	7%
Treatment			
Asymptomatic Lesion	Irrigation and Removal	4	14%
	Removal using Forceps	9	31%
	Simple Removal of Omphalolith	2	7%
	Omphalectomy	1	3%
	Not stated	1	3%
Painful Lesion	Incision and Drainage	4	14%
	Surgical Excision of Umbilical Abscess	3	10%
	Removal of omphalolith	2	7%
	Irrigation and Removal	1	3%
	Omphalectomy	1	3%
	Not stated	1	3%

Table 3. Difference in presentation in male versus female patients.

	Female	Male		P-value
Mean age (Range), years	56 (16-96)	34 (18-65)		0.006
No of Patients, n	17	12		
Country Reported			Total, N	
USA	10	4	14	
UK	3	0	3	
India	1	4	5	
Japan	2	1	3	
Morocco	1	0	1	
Qatar	0	1	1	
Saudi Arabia	0	1	1	
UAE	0	1	1	
Presentation				
Pigmented Umbilical Mass	8	2	10	0.011
Inflammation	3	9	12	
Incidental Finding	6	1	7	
Symptoms				
Asymptomatic	14	3	17	0.006
Pain and/or Discharge	3	9	12	