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Incidence of Umbilical Hernia in African Children: Redefinition of "Normal" and Reevaluation of Indications for Repair

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Abstract. This study was undertaken to assess the degree of ubiquity of umbilical hernias (UHs) in Nigerians and to determine if a laissez faire approach to the presence of UHs is justified. A prospective evaluation was conducted of the umbilical area of 4052 Nigerians living in the vicinity of the Baptist Medical Centre (BMCO) in Ogbomoso, Nigeria. The diameter of the fascial defect was measured with the subject supine and the protrusion of the umbilical skin with the subject erect. Subjects were divided into three groups: group 1 (1 month to 18 years old); group 2 (older than 18 years); and group 3 (pregnant women in an antenatal clinic). "Outies" (defined as any protrusion of the umbilical tip past the periumbilical skin) were present in 92% of group 1, 49% of group 2, and 90% of group 3 subjects. UHs (defined as protrusion of at least 5 mm and diameter of at least 10 mm) were present in 23% of group 1, 8% of group 2, and 15% of group 3 subjects. Spontaneous closure of UHs seems to occur until age 14. A retrospective analysis identified 11 patients undergoing emergency operations for UH-related problems during the past 15 years. With a low incidence and 0% mortality rate associated with management of these emergencies, a policy of prophylactic repair is not justified at BMCO. Because most of the children we examined had outies, repair for cosmetic reasons is rarely requested. The only logical indication for repair of UHs at BMCO is incarceration, and this rarely occurs.

Umbilical hernias (UHs) are ubiquitous in African children, or so it seems to a Western-trained surgeon watching a shirtless group of Nigerian children playing soccer. UHs are regarded in some cultures as a hallmark of beauty [1, 2]. There are anecdotal reports of mothers bringing their children for medical care because the children did not have a UH. UHs are usually ignored by medical practitioners in Africa. Rarely is the presence of a UH even mentioned during routine physical examinations. A "UH tenderness test" is used to evaluate peritonitis in Nigerian children, and UHs are used as diagnostic paracentesis portals [3]. Few practitioners in Africa make an effort to repair umbilical fascial defects when performing laparotomy for other indications such as cesarean section. This study was undertaken to determine the degree of ubiquity of UHs in our location in Nigeria and to determine if a laissez faire approach to the presence of UHs is justified.

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Materials and Methods

This prospective evaluation (from July to December 1998) examined the umbilical area of 4052 Nigerians (98% from the Yoruba ethnic group) living in the vicinity of the Baptist Medical Centre (BMCO) in Ogbomoso, Nigeria. The diameter (DIA) of the umbilical fascial defect (UFD) was measured with the subject in a supine position and the abdominal wall muscles relaxed as much as possible. The protrusion (PRO) of the tip of the umbilical skin past the periumbilical skin was measured with the subject erect. The tip of the examiner's finger was used to measure the DIA, and a ruler was used to measure the PRO. Precise measurement of the DIA was difficult, especially when the DIA was less than 5 mm. All measurements were performed by the same investigator (R.O.) to eliminate the bias inherent in a system with multiple observers. A second author (D.M.) also examined some subjects at random to ensure confidence in the reliability of the data.

Subjects were divided into three groups. Group 1 consisted of children older than 1 month but younger than 18 years who entered the medical center premises for any reason. Some of these subjects were patients being treated in the outpatient clinic or on the pediatric ward. Others had simply accompanied patients to the hospital. Additional group 1 children were recruited from local primary and secondary schools. Group 2 subjects were older than 18 years and were randomly selected from people, including hospital employees, entering the hospital premises for any reason. Group 3 consisted of pregnant females being followed in an antenatal clinic. To estimate the number of complications related to UHs in our patient population, a retrospective analysis was conducted of all patients undergoing emergent UH operations at BMCO during the past 15 years. Statistical analysis of all data was

Table 1. Data for all groups.

Group	No. in group	Age (years)	M/F	Mean diameter (mm)	Mean protrusion (mm)	UH[a] present (%)	"Outie"[b] present (%)
Group 1	2542	0–18	1.1	4.7	10.0	23	92
1A	970	0–2	1.0	5.6	12.2	28	94
1B	682	3–6	1.3	4.8	8.4	23	96
1C	420	7–10	1.1	4.3	7.4	21	94
1D	289	11–14	1.0	4.1	7.2	19	84
1E	181	15–18	1.3	1.9	4.2	8	74
Group 2	1008	19–70	0.8	2.3	3.2	8	49
Group 3	502	14–41	All female	5.4	4.9	15	90

[a]Definition of umbilical hernia (UH) is a diameter of at least 10 mm and protrusion of at least 5 mm.
[b]"Outie" refers to protrusion of the umbilical skin tip past the periumbilical skin.

Table 2. Percentage of group 1 subgroups with various sized umbilical fascial defects.

Group	No palpable UFD (%)	Incidence of UFD (%), by size		
		Small (1–4 mm)	Medium (5–14 mm)	Large (at least 15 mm)
1A	20	33	38	9
1B	38	28	26	8
1C	41	25	27	7
1D	48	19	26	7
1E	72	14	11	2

UFD: umbilical fascial defects.

conducted using chi-square testing and Tukey-type multiple comparison testing among proportions.

Results

Data for all groups are presented in Table 1. There were 2542 subjects in group 1, 1008 in group 2, and 502 in group 3. Group 1 was further divided into five subgroups based on age: group 1A, 0–2 years; group 1B, 3–6 years; group 1C, 7–10 years; group 1D, 11–14 years; and group 1E, 15–18 years. The mean umbilical fascial DIA for group 1 was 4.7 mm (range 5.6 mm in group 1A to 1.9 mm in group 1E). The mean umbilical skin PRO for group 1 was 10.0 mm (range 12.2 mm in group 1A to 4.2 mm in group 1E). Only 207 (8%) children had a flat or inverted umbilical skin tip. This ranged from 6% of group 1A children to 26% of group 1E. The PRO was 10 mm or greater in 1009 (40%) group 1 subjects (range 60% in group 1A to 12% in group 1E). The longest PRO was 6 cm and the largest DIA 6 cm. Table 2 organizes the group 1 UFDs into small, medium, and large based on the DIA.

Group 2 subjects had a mean DIA of 2.3 mm and a mean PRO of 3.2 mm. A flat or inverted umbilical skin tip was noted in 517 (51%) of these adult subjects. The PRO was 10 mm or more in 89 (9%). The longest PRO was 8.7 cm and the largest DIA 4.5 cm. The pregnant subjects in group 3 had a mean DIA of 5.4 mm and a mean PRO of 4.9 mm. Only 49 (10%) had a truly flat or inverted umbilical skin tip. The PRO was 10 mm or more in 51 (10%). The longest PRO in group 3 was 5.8 cm and the largest DIA 4.1 cm.

A retrospective analysis identified 11 patients (2 children, 9 adults) who underwent emergent operations for UH during the past 15 years at BMCO. There were three cases of visceral strangulation requiring resection in the adult group but none in the pediatric group. There were no deaths among these 11 patients.

Discussion

This prospective study was conducted to determine the validity of the observation that UH "abnormalities" are not really abnormal in Nigeria. A problem arises, however, when defining UH. A true hernia requires the presence of an abnormal opening and protrusion of viscera or tissue through the opening. There is no consistent opinion in the literature as to what constitutes a UH. Some authors [4, 5] insist that there must be a visible, expansile protrusion upon straining to be classified as a UH. A large fascial defect with a large protrusion that does not expand upon straining would not, therefore, be considered a UH by these authors. Other authors [6] define UH as protrusion of abdominal contents of 0.5 cm or more with a palpable fascial defect of at least 1 cm. Still other authors [7] concentrate on the size of the fascial defect alone and subdivide defects into three groups based on size: small < 0.5 cm; medium 0.5–1.5 cm; and large > 1.5 cm. Other authors have left the definition of UH to the imagination of the reader. To minimize this controversy, the criteria proposed by Hall et al. [6] (PRO at least 5 mm and DIA at least 10 mm) was used to define UH for subjects in this series. Using this definition, 23% of group 1 subjects had a UH (range 28% of group 1A to 8% of group 1E). In a study of black children in the United States [6] 8% of children between 6 and 11 years of age had a UH. The 6- to 11-year old subgroup of children in our study had a significantly higher ($p = 0.001$) incidence (21%) of UH. Eight percent of adults in group 2 had a persistent UH. There was no significant difference between the incidence in males (7.6%) and nonpregnant females (8.5%). A UH was present in 15% of the pregnant women in group 3. The difference in incidence of UH between the nonpregnant females in group 2 and the pregnant ones in group 3 was significant ($p = 0.002$).

Of the 2542 children in group 1, an amazing 2335 (92%) had an "outie," defined as the tip of the umbilical skin protruding past the periumbilical skin. This ranged from 94% of group 1A (0–2 years old) to 74% of group 1E (15–18 years old). Of these children with protruding umbilici, 899 (39%) did not have a palpable fascial defect. We observed, during this study period, an entity of the umbilicus that is comparable to a communicating hydrocele of the groin with a fascial opening too small for viscera or omentum to protrude but large enough for intraperitoneal fluid to pass. Several children with a definite protuberance of the umbilicus but without a palpable fascial defect were found at laparotomy for other indications to have such small "probe-patent" umbilical fascial defects. With the limitations of the measurement tech-

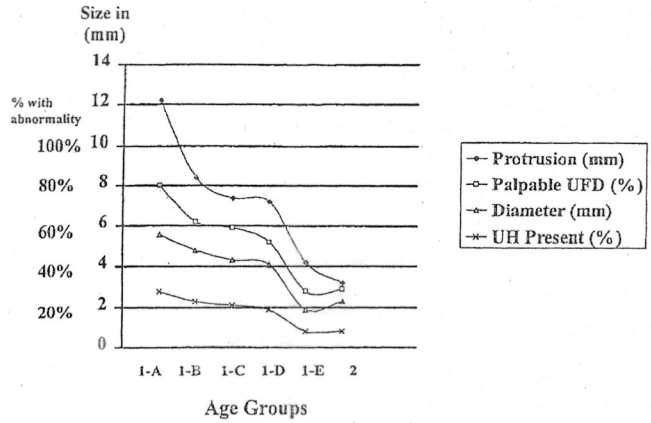

Fig. 1. Umbilical defects continue to close until age 14, after which the incidence is no different from that of adults. UFD: umbilical fascial defects; UH: umbilical hernia.

niques used in this study, we could not tell whether the umbilici of the 899 children without a palpable fascial defect protruded because of a small, patent fascial defect or simply because of an overabundance of fibrous tissue from a healed umbilical fascial defect. Outies were present in almost half (49%) of the Nigerian adults in group 2, and 40% of them had no palpable fascial defect. Outies were present in 90% of the pregnant females in group 3.

It is traditionally taught that UHs that have not closed by age 6 probably will not close [4, 7, 8, 9]. This view has been challenged, however, by investigators [6] who propose that many UHs, if left alone, close spontaneously during the adolescent years. Our data support this view. Tukey-type multiple comparison statistical tests show that, in our population, closure of umbilical fascial defects continues until approximately 14 years of age. Figure 1 demonstrates that no matter what parameter is selected (presence of UFD, presence of UH, mean DIA, mean PRO), there is a progressive decrease until age 14, at which time parameters are no different from adult values.

Traditional indications for repair of UHs include (1) treatment of incarceration [7]; (2) prevention of incarceration during childhood [10] or adulthood [11]; and (3) prevention or treatment of psychological or cosmetic problems caused by UHs. Interesting additional indications proposed for repair of large, proboscoid hernias include (1) excessive manipulation of the hernia by the child; and (2) attempts at urination from the hernia by a female child [9]. Most authors accept incarceration as a valid indication for operative repair, although Heifetz et al. [12] stressed that strangulation, not just incarceration, is the only indication for operative closure in infants and children. Two recent reports have called attention to the occurrence of incarceration [10] and even strangulation [13] of UHs in children. Both reports suggest a more aggressive management plan, but neither goes so far as to advocate repair of all UHs in children. Haller et al. [11] reported a 6% mortality rate and a 9-day hospitalization for adults (mostly multiparous, obese women) undergoing emergency operations for incarcerated UHs, and they recommended elective repair of all umbilical defects of 1.5 cm or more in females older than 2 years and males older than 4 years. Applying these criteria to our patient population, 6% of all females would need UH repair at age 2 years, and 8% of all males would need repair at age 4 years. The small number (9 adults, 2 children) requiring emergency operation for incarceration during the last 15 years at BMCO and the low complication rate (three with strangulated viscera, 0% mortality) do not justify such a proactive approach in our institution.

Psychological and cosmetic reasons are frequent indications for UH repair in Western hospitals. Evans [14] noted that "every mother wishes her baby to have a navel that tucks in and out of the way." This is not the case in our locale. Occasionally at BMCO a mother requests operative repair of a large, proboscoid UH, but most of the time there is no need perceived by the parent or subject to repair a UH for cosmetic reasons. Because most of the children we examined had protruding umbilici ("outies"), the abnormal umbilici in our children were those that were flat or had inverted umbilical skin ("innies"). Why undertake an operation that makes a child different from other children? Because of this rationale, cosmesis is not a common indication for repair at BMCO. The only logical and consistent indication for repair of UHs at BMCO is incarceration, and this rarely occurs. Our data support an expectant approach [12, 15] to the management of children and adults with UHs in our locale.

Résumé

Cette étude a été entreprise pour évaluer le degré d'ubiquité des hernies ombilicales (HO) chez le Nigérien et pour déterminer si une attitude conservatrice était justifiée. Une évaluation prospective a été réalisée chez 4052 Nigériens habitant dans la région autour du Centre médical Baptiste (BMCO) à Ogbomosho, Nigeria. On a mesuré le diamètre du déficit aponévrotique en décubitus dorsal et le degré de protrusion de la peau ombilicale sur le sujet debout. On a divisé les sujets en 3 groupes: Groupe 1 (âgés de 1 mois à 18 ans), groupe 2 (âgés de plus de 18 ans) et groupe 3 (femmes enceintes vues dans une clinique anténatale). Les «protrus» (définis comme toute protrusion de l'ombilic au-delà de la peau périombilicale) composaient 92% des patients dans le groupe 1, 49% du groupe 2, et 90% du groupe 3. Les «HO» (définies par une protrusion d'au moins 5 mm avec un diamètre de déficit aponévrotique d'au moins 10 mm) ont été retrouvés chez 23% des patients du groupe 1, chez 8% du Groupe 2 et chez 15% du groupe 3. Une fermeture spontanée des HO semble possible jusqu'à l'âge de 14 ans. Une analyse rétrospective a pu identifier 11 patients ayant nécessité une intervention d'urgence pour un problème en rapport avec le type HO durant ces 15 dernières années. Comme l'incidence est basse et la mortalité nulle pour ce qu'était les urgences, la cure à titre prophylactique n'est pas justifiée au BMCO. Puisque la majorité des enfants examinés avaient une simple protusion, la cure pour des raisons purement esthétiques est rarement demandée. La seule indication opératoire logique à notre Centre pour les simples protrusions ombilicales serait l'incarcération, ce qui est extrêmement rare.

Resumen

Este estudio se realizó con objeto de averiguar: la frecuencia de la hernia umbilical (Uhs) en los nigerianos y si la abstención terapéutica estaba o no justificada. Se efectuó una evaluación prospectiva de la región umbilical en 4.052 nigerianos residentes en áreas próximas al Centro Médico Baptista de Ogbomoso

(BMCO) (Nigeria). El diámetro del defecto fascial fue valorado con el sujeto en decúbito supino y la protusión de la piel umbilical con el individuo en posición erecta. La población estudiada se dividió en 3 grupos. Grupo 1 (de edades comprendidas entre 1 mes y 18 años) Grupo 2 (mayores de 18 años) y Grupo 3 (mujeres embarazadas y revisadas en una clínica preparto). "Outies" (entendiendo por tales aquellos sujetos en los que no existe protusión alguna, no sobrepasando la punta del ombligo la piel periumbilical) constituyen el 92% del Grupo 1, 49% del Grupo 2 y 90% del Grupo 3. Hernias umbilicales [(Uhs), definida como una protusión por lo menos de 5 mm y un diámetro al menos de 10 mm] se observaron en el 23% del Grupo 1, 8% del Grupo 2 y 15% del Grupo 3. Parece pues, que se produce una oclusión espontánea de las hernias umbilicales a lo largo de los primeros 14 años de vida. Un análisis retrospectivo de 15 años, consiguió identificar 11 pacientes que tuvieron que ser intervenidos de urgencia por complicaciones de su hernia umbilical. La mortalidad fue 0%, por lo que no parece estar justificado el tratamiento profiláctico de las hernias umbilicales en el BMCO. Dado que la mayoría de los niños explorados pertenecían a la categoría "Outies", el tratamiento reparador con fines cosméticos rara vez es solicitado. La única indicación para el tratamiento quirúrgico de la Uhs en el BMCO es la rara incarceración herniaria.

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