# Umbilical Hernia

## A Retrospective Study

OSCAR J. JACKSON, M.D., AND L. H. MOGLEN, M.D., *San Francisco*

● *One hundred thirty-four cases of umbilical hernia in adults were analyzed as to etiologic and other significant factors. Congenital umbilical hernia is of much higher incidence in black people than white. This is not true of acquired umbilical hernia. On retrospection it was noted that congenital hernias that persisted into adult years had been 1.5 cm or more in diameter in infancy. This indicates that hernia size is a criterion for repair early in life.*

AN UMBILICAL HERNIA is an incomplete closure of the umbilical ring through which protrusion of intra-abdominal contents may occur. It is covered by skin, which differentiates it from an omphalocele.

The exact etiology of umbilical hernia is unknown; however, several factors are known to contribute:

Premature infants have a higher incidence of umbilical hernia (84 percent in newborn infants weighing 1000 to 1500 grams but only 20.5 percent in those weighing 2000 to 2500 grams[1]).

Woods[2] noted that infants who weigh over 3200 grams at birth have a higher incidence of hernia. He postulated that persistence of the defect may be owing to the large size of the umbilical cord in these infants.

Racial factors undoubtedly contribute. The incidence of umbilical hernia in Negroes at birth is very high. Crump[3] indicated that the incidence of umbilical hernia in Negroes under one year of age was about 41 percent. This figure fell to 15.9 percent in Negroes at four years of age, and to a very low number after eight years.[3] Evans,[1] in a study of 1,339 Negro infants under one year of age, found an incidence of 31.8 percent under the age of six weeks. The incidence in his study was 9.5 percent by 26 weeks, and increased to 12.6 percent at one year of age. This incidence is much higher than the 4.1 percent in white children born at full term. In white infants the incidence was only 1.9 percent at one year of age. The last two studies demonstrate an extreme racial difference in congenital umbilical hernia. In both races the incidence falls rapidly during the early years of life, but a certain number of hernias persist. These persistent hernias are referred to as the "congenital residue."

The present study was made in an attempt to evaluate the congenital residue from the adult level, and to analyze a series in which umbilical hernias in adults were repaired surgically at a large community hospital and at a county facility.

## Materials and Methods

During a ten-year period, 97 patients with umbilical hernia underwent repair at Mt. Zion Hospital, a large community hospital. During the same period, 37 patients with umbilical hernia were treated at the San Francisco Gen-

From the Department of Surgery, University of California, San Francisco, School of Medicine, San Francisco General Hospital; and Department of Surgery, Mt. Zion Hospital, San Francisco.

Submitted March 30, 1970.

Reprint requests to: 1352 Haight Street, San Francisco, Ca. 94122 (Dr. O. J. Jackson).

**TABLE 1.—*Incidence of Symptoms of Umbilical Hernia in Private and Charity Patients***

| *Symptoms* | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| Tenderness | 26 | 43 | 8 | 32 | 34 | 38 |
| Digestive discomfort | 5 | 8 | 3 | 12 | 8 | 10 |
| Protrusion with Pain | 9 | 15 | – | – | 9 | 11 |
| Protrusion with enlargement | 5 | 8 | 7 | 28 | 12 | 14 |
| Protrusion with Pain & Incarceration | 15 | 25 | 7 | 28 | 22 | 27 |
| Total Cases | 60 | | | | 85 | |

**TABLE 2.—*Age of Patients with Umbilical Hernia***

| *Age (Years)* | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| 18-30 | 16 | 8 | 5 | 14 | 21 | 15 |
| 31-40 | 16 | 16 | 6 | 16 | 22 | 17 |
| 41-50 | 28 | 29 | 6 | 16 | 34 | 25 |
| Over 50 | 37 | 38 | 20 | 54 | 57 | 43 |
| Total Cases | 97 | | | | 134 | |

**TABLE 3.—*Data on Sex of Patients with Umbilical Hernia***

| | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| Male | 30 | 31 | 17 | 46 | 47 | 35 |
| Female | 67 | 69 | 20 | 54 | 87 | 65 |
| Total Cases | 97 | | | | 134 | |

**TABLE 4.—*Race of Patients with Umbilical Hernia***

| *Race* | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| Caucasian | 65 | 67 | 17 | 46 | 82 | 61 |
| Black | 32 | 33 | 20 | 54 | 52 | 39 |
| Total Cases | 97 | | | | 134 | |

**TABLE 5.—*Data on Race, Sex and Size of Opening in Eight Cases of Congenital Hernia***

| *Age (Years)* | *Sex* | *Race* | *Size (cm.)* |
|---|---|---|---|
| 56 | Female | Black | 4 |
| 44 | Male | Black | 3 |
| 61 | Female | Black | Less than 2 |
| 57 | Male | Caucasian | ? |
| 36 | Male | Caucasian | Less than 2 |
| 25 | Female | Black | 2 |
| 27 | Female | Black | 5 |
| 30 | Male | Black | Less than 2 |
| 23 | Male | Black | 3 |
| 27 | Male | Black | 3 |

eral Hospital, a large city institution. Table 1 shows the presenting symptoms of patients undergoing umbilical herniorrhaphy, and in both groups tenderness was the predominant complaint. However, many patients also had protrusion, pain and incarceration.

Most of the patients were over 50 years of age, and the next highest number was in the 40 to 50 age group (Table 2). This age pattern is quite similar to that in a series from the Los Angeles County Hospital reported by Gibson and Gaspar.[6] There were more females in both series, but not to the extent usually seen (Table 3). In the present series the ratio of females to males was about 2 to 1, compared with 10 to 1 in the series from the Los Angeles County Hospital.[6]

A somewhat surprising finding was the relatively high proportion of Caucasians as compared with Negroes. In the Mt. Zion series, and even in the group from the San Francisco General Hospital, which has a large black population, there was an almost even racial incidence (Table 4). However, as to congenital hernias only, there was a predominance of Negroes. This seems to indicate that in acquired umbilical hernias, the racial difference is insignificant.

Eight patients in the Mt. Zion series had a history of congenital hernia. This represents approximately 10.9 percent of the series, which correlates well with the "congenital residue" seen in the series by Heifetz and Walker.[4] A further analysis of the hernias listed as being congenital is even more revealing (Table 5). Of the eight patients, six were Negro and two were Caucasian, which again points out the predominantly Negro racial incidence in the congenital hernias. Furthermore, in most cases of residual congenital hernias on which retrospective information was available, the opening had been greater than 1.5 cm in infancy, which accords with a prediction in Heifetz's and Walker's series. Two patients in the San Francisco General

TABLE 6.—*Duration of Symptoms of Umbilical Hernia at Time of Operation*

| *Duration* | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| Under one month | 7 | 11 | 3 | 14 | 10 | 11 |
| 1-6 months | 11 | 17 | 5 | 23 | 16 | 18 |
| 7-12 months | 8 | 12 | 4 | 18 | 12 | 13 |
| 1-3 years | 11 | 17 | 0 | 0 | 11 | 12 |
| 4-10 years | 18 | 27 | 4 | 18 | 22 | 25 |
| Over 10 years | 5 | 8 | 4 | 18 | 9 | 10 |
| Congenital | 8 | 10.9 | 2 | 9 | 10 | 11 |
| Total Cases | 68 | | | | 90 | |

TABLE 7.—*Rapidity of Onset of Umbilical Hernia*

| | *Private No.* | *Percent* | *Charity No.* | *Percent* | *Total No.* | *Percent* |
|---|---|---|---|---|---|---|
| Sudden Onset | 12 | 18 | 6 | 17 | 20 | 19 |
| Gradual Onset | 54 | 82 | 29 | 83 | 83 | 81 |
| Total Cases | 66 | | | | 103 | |

TABLE 8.—*Analysis of Cases of Umbilical Hernia with Sudden Onset*

| *Precipitating Event* | *Number* | *Age (Years)* | *Size (cm)* |
|---|---|---|---|
| Following Childbirth | 4 | 28,31,46,56 | <2 |
| Lifting | 4 | 35,42,43,64 | <2 |
| Sports | 2 | 31,42 | <2 |
| Cough | 2 | 49,54 | <2 |
| Sudden incarceration | 3 | 51,43,84 | <2 |
| Lifting | 1 | 42 | >2 |
| Lifting | 1 | 28 | 2 |

TABLE 9.—*Data on 17 Patients Who Had Emergency Operation because of Incarceration of Hernia*

| *Age (Years)* | *Number of patients* |
|---|---|
| 40-50 | 6 |
| 51-60 | 7 |
| Over 60 | 4 |
| *Hernia size (where recorded)* | *Number* |
| Greater than 2 cm | 11 |
| Less than 2 cm | 2 |

Hospital series had a history of congenital hernia. Both patients were black and both hernias were larger than 1.5 cm. Most of the hernias were of short duration; approximately 11 percent were diagnosed less than a month before operation (Table 6), and approximately 40 percent were of less than 12 months' duration.

Eighteen percent of the hernias were of sudden onset (Table 7); and most of this group were associated with a rapid increase in intra-abdominal pressure. Several of these hernias were initiated by such activities as participation in sports, lifting heavy objects or by coughing. This is entirely compatible with the sudden appearance of inguinal hernia in similar circumstances.

Twenty patients had emergency operation because of incarceration. Patients more than 40 years old and with a hernia ring larger than 2 cm were the most likely to require emergency operation. Further information on cases in which it was available is given in Table 9.

## Discussion

Heifetz, et al, in a study of 78 Negro infants with umbilical hernia larger than 0.5 cm, noted that the hernia ring appeared to close by approximately 18 percent of its area per month once closure began. In approximately 8 percent of their series, the hernia did not close during the period of the study; these unclosed hernias represented the "congenital residue." These cases were not further analyzed (although it was noted that three of the patients had concurrent diastasis recti). The size of the persistent hernias was not recorded. However, these observers expressed belief that all of the umbilical hernias would close in time.[4] Walker, in a similar study of 426 umbilical hernias observed over a six-year period, found that 96 percent of hernias with an internal fascial ring of less than 0.5 cm in diameter healed spontaneously; none with a diameter greater than 1.5 cm healed spontaneously. He also correlated healing with the size of the fascial ring, generalizing that hernias with internal rings of less than 1 cm healed by the time the patient was two years old, and those with rings of 1 cm or thereabouts took until about age four to heal. The average diameter of hernias that

healed spontaneously was 0.5 cm; the average of those that did not heal was 1.3 cm. The congenital residue consisted of approximately 10.8 percent of Walker's series. As previously stated, most of these were bigger than 1.5 cm. Further, it was Walker's contention that the hernia ring would provide a suitable index to which hernias should be repaired.[5] The present study appears to be in agreement with Walker because all hernias recorded as congenital were 1.5 cm or more at the ring. It is also noteworthy that when hernia rings were larger than 1.5 cm there was greater likelihood of need for surgical correction. Conversely, umbilical hernias with smaller ring sizes in adults appear to be of short duration and are often associated with sudden or insidious increase in intra-abdominal pressure.

## REFERENCES


1. Evans AG: The comparative incidence of umbilical hernias in colored and white infants. J Nat Med Assoc 33:158—160, 1944
2. Woods GE: Some observations on umbilical hernia in infants. Arch Dis Child 28:450—462, 1953
3. Crump EP: Umbilical hernia—Occurrence of the infantile type in Negro infants and children. J Pediat 40:214—223, 1952
4. Heifetz CJ, Bilsel ZT, Gaus WW: Observations on the disappearance of umbilical hernias of infancy and childhood. Surg Gynec Obstet 116: 469-473, 1963
5. Walker SH: The natural history of umbilical hernia—A six year follow-up of 314 Negro children. Clin Pediat 6:29—32, 1967
6. Gibson LD, Gasper MR: A review of 600 cases of umbilical hernias. Inter Abst Surg 109:313-22, 1959


## HYPERKALEMIA AND ACIDOSIS IN SHOCK

"Renal insufficiency is inevitable in shock – it's part of the definition; and this is certainly true in shock due to infection. Mechanisms include renal vasoconstriction, hypovolemia, and renal infection. Hyperkalemia and acidosis may reach lethal proportions within only a few hours. I think that's a point not generally understood. We're all used to these phenomena coming on over a period of days in people without kidneys or in people with medical renal insufficiency. In shock, where there's a marked catabolic effect of massive infection plus tissue anoxia, the combined effects of hyperkalemia and acidosis may be lethal within just a few hours. You have to watch for this by monitoring the blood chemistries frequently."

—EDWARD D. FRANK, M.D., Boston

Extracted from *Audio-Digest Surgery*, Vol. 16, No. 8, in the Audio-Digest Foundation's subscription series of tape-recorded programs.