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ACUTE INTESTINAL OBSTRUCTION BY *ASCARIS*

Analysis of 455 cases

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SUMMARY

The Authors report 455 cases of intestinal obstruction by *Ascaris* in children up to 11 years old. The clinical and radiological pictures are described stressing the elements of differential diagnosis between the simple cases and those complicated by volvulus, perforation, intestinal necrosis and peritonitis. The clinical and surgical proceedings adopted as well as their respective results are also reported.

INTRODUCTION

Intestinal obstruction is the foremost complication of ascariasis. This is a helminthic infection (*Ascaris lumbricoides* Linnaeus, 1758) of an endemic nature and high incidence in tropical and sub-tropical areas, varying in accordance with geographical and socio-economical factors. It prevails in under-developed countries, as pointed out by CURTI[4] in a report of 205 cases studied at the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, also by DASMOHAPATRA et al.[5] with 200 cases, and CARVALHEIRA & SCHILLER[3] with 129 cases. In more developed countries incidence of intestinal obstruction by *Ascaris* is as a rule seldom, a fact which turns reports of cases into bibliographical rarities such as those of LAGROT & LAVERGNE[6] and BOUCHIT et al.[2].

CASE REPORTS

This paper reports 455 cases of intestinal obstruction by *Ascaris* which came to the First Aid Unit of the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, from 1945 up to 1970. The first 205 cases, up to 1960, have already been reported (CURTI[4]).

I. *Incidence*

1 — AGE — distribution was as reported in Table I.

The higher incidence in the first 2 years of life (44.6%) corresponds to the period of higher contamination in children.

2 — SEX — there were 235 cases (51.6%) in males, 217 (47.7%) in females and in 3 cases (0.7%) the sex was not reported. There was, to all intents and purposes, no statistical difference.

3 — RACE — the distribution according to race followed the same steps as for population, there being 337 (73.2%) whites, 56 (12.3%) negroes and 66 (14.5%) mulattoes.

II. *Clinical picture*

The subjects were seen at the First Aid Unit after a lapse of onset of symptoms from 2 hours up to 15 days.

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TABLE I

Distribution according to age

Age	1	2	3	4	5	6	7	8	9	10	11
No. of cases	96	107	66	33	48	37	27	21	8	4	8
%	21,1	23,0	14,5	7,3	10,5	8,1	5,9	4,6	1,8	0,9	1,8

Symptomatology varied from pains of a colic nature, intermittent fits of crying together with tossing followed by periods of calm when intestinal rumbling could be heard, and prostration. On evolution of the obstruction there were noticeable peristaltism and abdominal distension, pain became continuous; at last there was a phase of analgesia characterized by huge distension, abdominal silence and no pains. Nausea and vomiting were reported as accompanying pain. Vomiting was at first alimentary, then bilious and at last intestinal, showing the presence of *Ascaris*. In spite of being a high situated intestinal obstruction, frequently the discharge of stools and gases was entirely stopped, which shows a total occlusion of the intestinal transit. In more than 50% of cases a previous discharge of worms in stool was reported, thus making the diagnosis of obstruction easier. In some case there was also a report of mucus and blood.

The clinical manifestations were distributed as reported in Table II.

Localization of the palpable abdominal tumor is reported in Table III.

Table IV shows the symptomatology of groups treated clinically or surgically from the last 250 cases, in order to call attention to the importance of diagnosis so as to provide an adequate treatment.

III. *Diagnosis* — based on the following elements:

A) Clinical picture, characterized by a) onset signs — abdominal pains of colic nature, nausea and vomiting; b) cardinal signs — stoppage of discharge of stools and gases, and abdominal distension, and c) associated signs — general and local.

TABLE II

Clinical pictures

Pulse 100	299	(65.7%)
Temperature 37°C	200	(43.9%)
Abdominal pain	395	(86.8%)
Vomiting, alimentary	249	(54.7%)
Vomiting, bilious	70	(15.4%)
Vomiting, fecaloid	5	(1.1%)
Oral discharge of Ascaris	201	(44.2%)
Stool discharge stoppage	252	(55.4%)
Gas discharge stoppage	161	(35.4%)
Abdominal distension	267	(58.7%)
Noticeable peristaltism	85	(18.7%)
Previous discharge of worms	263	(57.8%)

TABLE III

Localization of the "Ascaris lump"

Peri-umbilical region	89	(19.6%)
Right lower quadrant	84	(18.5%)
Right upper quadrant	49	(10.8%)
Left upper quadrant	25	(5.5%)
Left lower quadrant	23	(5.1%)
Hypogastric region	24	(5.3%)
Total reported	294	(64.8%)

TABLE IV

Symptomatology of groups treated clinically and surgically

Over-all state	Clinical Treatment	Surgical Treatment	Total
Good	24 (17.1%)	22 (20.0%)	46 (18.4%)
Regular	80 (37.3%)	41 (37.3%)	121 (48.4%)
Bad	14 (10.0%)	39 (35.5%)	53 (21.2%)
Not reported	22 (15.7%)	8 (7.3%)	30 (12.0%)
Fever	62 (44.3%)	72 (65.4%)	134 (53.6%)
Dehydration	4 (2.8%)	76 (69.1%)	80 (32.0%)
Toxemia	1 (0.7%)	25 (22.7%)	26 (10.4%)
Shock	0 (0.0%)	3 (2.7%)	3 (1.2%)
Tachysphygmia	104 (74.3%)	99 (90.0%)	203 (81.2%)
Abdominal defense	0 (0.0%)	58 (52.7%)	58 (23.2%)
Abdominal distension	62 (44.3%)	82 (74.5%)	144 (57.6%)
Peristaltism	30 (21.4%)	15 (13.6%)	45 (18.0%)
Painful decompression	0 (0.0%)	31 (28.2%)	31 (12.4%)
Hydro-aerial rumors	12 (8.6%)	31 (28.2%)	43 (17.2%)
Radiological signs	125 (89.3%)	77 (70.0%)	202 (88.0%)
TOTAL	140 (100.0%)	110 (100.0%)	250 (100.0%)

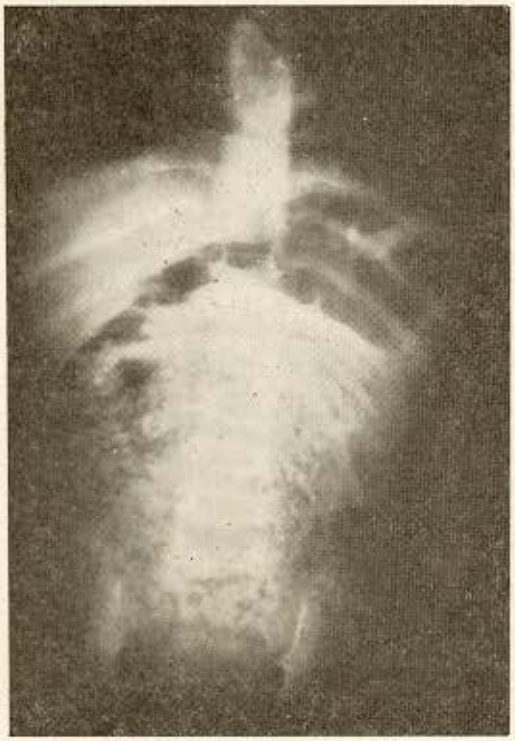

Fig. 1 — Occurrence of *Ascaris* lump and absence of radiological signs of vascular involvement of the intestinal loops.

B) Radiological — frontal simple radiographies of the abdomen in dorsal and ventral decubitus confirmed the diagnosis in 202 cases (88.0%), showing the following radiographical pictures in accordance with the evolution of illness:

1 — presence of an "*Ascaris* lump" with no involvement of the intestinal loops: this lump bears radiologically the likeness of bread crumbs or bee-hives (Fig. 1);

2 — presence of *Ascaris* lump with signs of intestinal suffering — the image is characterized by distension of the intestinal loop, with either thickening or edema of the walls and the presence of fluid levels in the radiography taken in the orthostatic position (Fig. 2, A and B);

3 — volvulus of the small intestine — verified by the presence of segmentary distension, with one or more loops in a circle or a semicircle, this being the radiological sign of a closed or Wahl loop, together with distension of the upper loops (Fig. 3, A and B); and

4 — peritonitis — shown by the presence of liquid between the intestinal loops as well

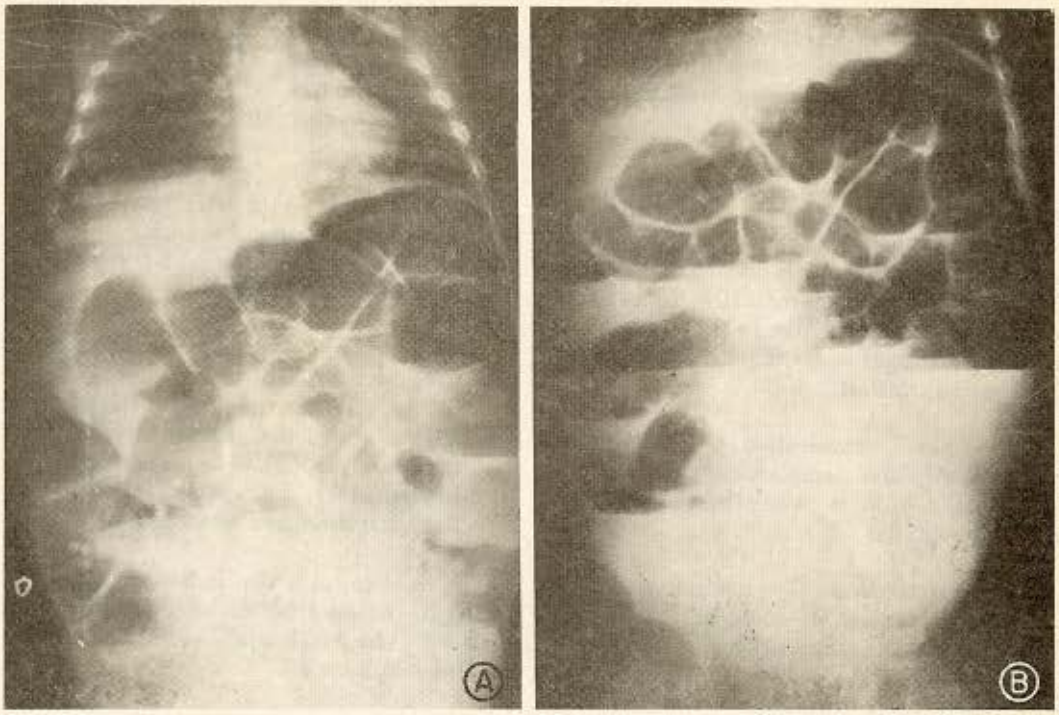

Fig. 2 — A) Radiography in horizontal position: lump of *Ascaris* at the right iliac fossa; B) Radiography in a standing position: intestinal distension, liquid levels, edema of the wall and free liquid in the peritoneum.

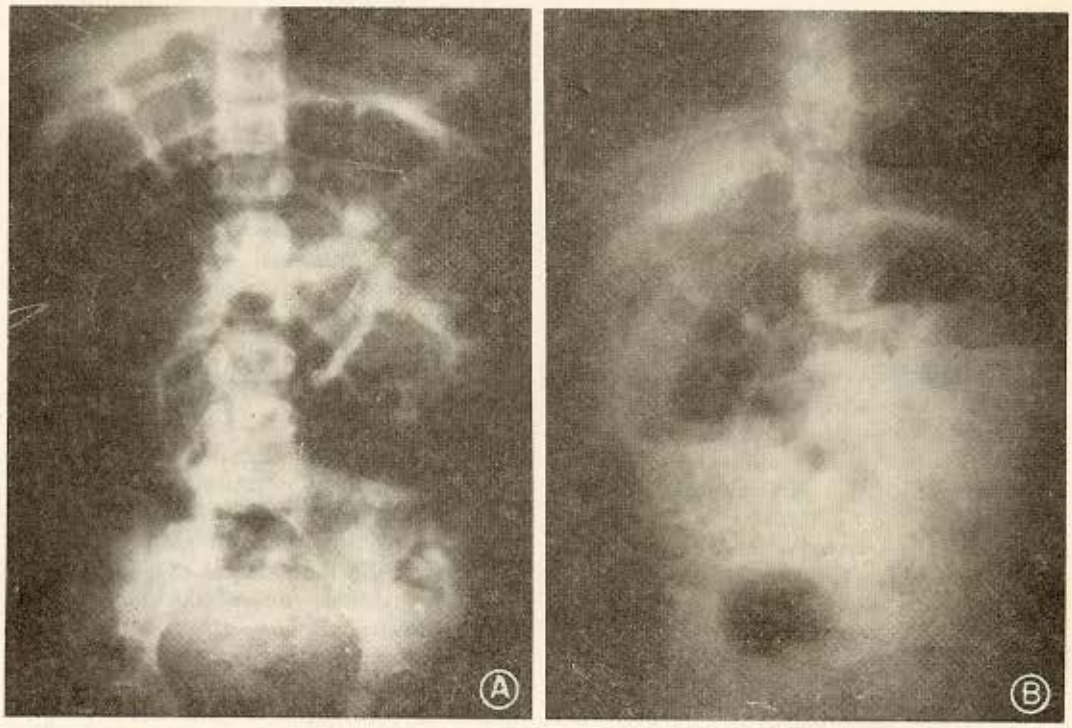

Fig. 3 — Obstruction complicated by volvulus. A) *Ascaris* lump at the hypogastrium and intestinal distension; B) Liquid levels, edema of the wall, distension of loops and liquid in the peritoneum.

as liquid levels inside them and, eventually, by the occurrence of pneumo-peritoneum when there is either perforation or breaking-up of the involved loops.

The barium — contrasted radiography is not a routine procedure in the obstruction syndrome. Whenever employed, it showed negative cylindric images among the barium contrast-medium and, eventually, the presence of a barium filament due to the ingestion of same by the worms, its digestive tract showing thus in contrast.

C — Blood examination — eosinophilia was noticed, and complicated cases showed neutrophilia with a swing to the left and also eosinophilia.

D — Antecedents — reports of earlier discharge of worms in stools, or else of eggs by routine stool examinations.

IV. *Differential diagnosis* — amongst a number of nosological entities we must draw especial attention to the following ones:

a) *Acute appendicitis* — of a higher incidence at pre-school and school ages, from 6 to 14 years, characterized by a continuous pain which starts at the epigastrium or periumbilical region and afterwards locates itself at the right iliac fossa; it is accompanied by nausea, vomiting, hyperesthesia of the skin, muscle contraction, sudden painful decompression and fever.

b) *Mesenteric adenitis* — characterized by colic-type pains, without nausea or vomiting, which usually strikes pre-school or school children; it comes together with other infectious processes, especially of the respiratory tract. On radiological examination one can see diffuse distension of the intestinal loops.

c) *Intestinal invagination* — this strikes sucklings, as from the 2nd month of life and only on occasion up to 3 years of age, the child shows a very good somatic development, abdominal colics, nausea, vomiting, abdominal distension, stops discharge of stools and gases after muco-bloody bowel movements. Examination of the abdomen shows distension and absence of the cecum at the right iliac fossa (sign of Dance). Opaque enema shows signs of obstruction with the characteristic images of "onion skin", or halfmoon, or goblet.

d) *Peritonitis* — of later onset the child has high fever, nausea, vomiting, intestinal ileum, generalized defenses and signs of a diffuse peritoneal irritation.

V. *Pathogenesis* — a number of theories have been forwarded in order to explain the helminthic pathogenic action in intestinal obstruction namely the mechanic, the toxic, the allergic, the spoiler, the inflammatory, the nervous, the irritating, the spasmodic and the ischemic ones.

The mechanical action is the most obvious, owing to the Ascaris' tendency to from tight balls — "*Ascaris* lumps" — which occlude the intestinal lumen.

VI. *Pathological anatomy* — the anatomopathological aspect depends on the evolution stage of the illness.

1) at first there is spasm of the intestinal loops which makes for the molding of the intestinal wall upon the *Ascaris*, with a consequent protrusion on its surface; the loop turns pale in contrast with the reaction hyperhemia of the blood vessels (Fig. 4).

2) when the obstruction causes suffering of the intestinal loops there is at first thickening of the intestinal wall which turns a wine-red color, with some dark, cyanotic, areas or patches (Fig. 5); on a later stage there is distension of the intestinal loops, the walls getting thinner and of a grayish wine-red color (cyanotic), with venous stasis;

3) at the most advanced evolution phase the intestinal loop turns salmon-colored, the walls thicken on account of the inflammatory edema, bredking easily and presenting a covering of fibrino-purulent exsudate; at last the loop becomes distended, the wall gets whin because it is formed by the serosa only on a account of necrosis of the sero-muscular layers; one can see by transparency the ileo-cecal contents, of a yellowish rose color (Fig. 6).

Fig. 4 — Surgical picture: spastic intestinal loops at the level of the *Ascaris* lump.

Fig. 5 — Surgical picture: loops with necrotic areas.

Fig. 6 — Surgical picture: necrosis of intestinal wall due to a volvulus caused by an *Ascaris* lump.

4) when there is necrosis and breaking-up of the loop, its wall opening in small or big areas, the intestinal contents and the worms pour into the peritoneal cavity (Fig. 7).

Fig. 7 — Surgical specimen: necrosis and breacking of the loop which contained the *Ascaris* lump.

VII. *Therapeutics*

A) *Clinical treatment* — in cases of recent onset, or else when the physical and radiographical examinations do not show signs of involvement of the intestinal loops, we proceed as follows: a) hospitalization and continuous observation; b) gastric sound (continuous or repetitive aspiration) in order to lessen or the prevent abdominal distension; c) parenteral food administration, based on saline or glycose solutions, plasma or blood; d) parenteral administration of anti-spasmodics and anti-cholinergics; e) ingestion by mouth of mild laxatives, preferably mineral oils; f) drugs containing piperazine for eradication of worms; g) the child will be kept under observation until the intestinal transit is re-established and the discharge of worms with stools is verified; h) radical treatment of the helminthic infection in order to prevent relapse of occlusion.

The treatment of ascariasis in its obstruction stage is made by means of piperazine, either as hexahidrate, phosphate, citrate, or adipate, in the following doses: 100 mg/kg as the initial intake; 65 mg/kg after 6 hours; if necessary another 65 mg/kg dose 6 hours after the second dose, the total amount not to be more than 4 to 4.5 g (AMATO [1]).

When these procedures do not result satisfactory, which should be re-establishment of the intestinal transit and anal discharge of worms; or if there is a turn for the worse in the general state of health, with clinical and radiological signs, then we advise surgery.

B) There are a number of surgical procedures in accordance with surgical findings: a) in simple obstructions laparotomy is to be performed and to undo the *Ascaris* lumps without crushing, mild maneuvres are used. This being obtained, the worms which protrude in the intestinal wall are delicately showed by digital maneures in a distal direction until they reach the cecum (Fig. 1 and 4). There is no need to press them through the anus; b) In cases of occlusion with intestinal suffering, characterized by distended loops (Fig. 2, A and B), with dark patches and a urine — red cyanotic color, we try to undo the lumps of *Ascaris* and do malaxation. We observe the return to normal coloring of the involved loop, by applying compresses woaked in lukewarm saline, for at least 10 minutes. If this handling is not successful we advise resection of the involved intestinal segment and try to shove the worms into the loop to be taken off (Fig. 5); c) When there is volvulus (Fig. 3, A and B), we untwist the same procedure already mentioned; d) In those cases where there is necrosis or breaking of the loop (Fig. 6 and 7), excision is performed including the lump of worms: If the neighbouring loops are in good condition, we re-establish transit by a termino-terminal anastomosis, with unabsorbable thread, in view of the high tropism of the helminth for a bloody tissue, blood and even catgut; breaking through the line of anastomosis the worm gets into the peritoneum; if the local conditions of the loop do not allow a prompt anastomosis, we chose excision and exteriorization of the loop and perform an ileostomy; e) In cases of simple perforation we advise suture.

One should avoid enterotomy with the purpose of taking out the worm, which might allow the passing of *Ascaris* from the intestinal lumen into the peritoneum, the overflowing of the enteric contents causing stercoral peritonitis.

Tables V and VI show respectively the surgical findings and the procedures adopted in those cases that underwent surgery (110) among the last 250.

VIII. *Results*

Table VII shows the results obtained. The cases were divided into 4 groups. The first 3 groups include the 205 cases observed earlier (CURTI [4]) and the fourth group the last 250.

TABLE V

Surgical findings

Ascaris lump	109	(99.1%)
Reversible suffering of loop	15	(13.6%)
Necrosis	47	(42.7%)
Volvulus	27	(24.5%)
Perforation of loop	15	(13.6%)
Ascaris in the peritoneum	13	(11.8%)

TABLE VI

Surgical procedures

Malaxation	98	(89.1%)
Intestinal resection	49	(44.5%)
Suture	6	(5.5%)
Ileostomy	4	(3.6%)
Colostomy	1	(0.9%)

TABLE VII

Mortality

Series	Clinical Treatment	Surgical Treatment	Total of deaths
1	9 — 1 (11.1%)	9 — 4 (44.4%)	18 — 5 (27.7%)
2	44 — 1 (2.2%)	6 — 3 (50.0%)	50 — 4 (8.0%)
3	132 — 2 (1.5%)	5 — 0 (0.0%)	137 — 2 (1.4%)
4	140 — 1 (0.7%)	110 — 27 (24.5%)	250 — 28 (11.2%)
TOTAL	325 — 5 (1.5%)	130 — 34 (26.1%)	455 — 39 (8.6%)

DISCUSSION

Intestinal obstruction complicated by *Ascaris* is relativelly frequent, witness the 130 (28.5%) cases which needed surgical procedures, amongst the 455 studied.

The classical picture of intestinal obstruction, characterized by pain, nausea, vomiting, stoppage of discharge of stools and gases, distension and abdominal tumefaction, was present in more than 50% of cases; the discharge of worms in stools was also reported in more than 50% of cases.

The differential diagnosis in the obstruction syndrome is relatively easy, because the other two affections more incident in children are: intestinal invagination which occurs in the first twelve months of life, during the nursing from 6 years onwards.

A comparison between the cases which came to us during the last ten years and which were submitted either to surgery of to a conservative clinical treatment (Table IV) shows that the patients who underwent surgical operations had a much more severe clinical picture.

Radiological examination is of great help for instituting surgical procedures because, when present, the radiological signs demand a change in therapeutical management.

The discharge of *Ascaris* as an antecedent does not always signify that the intestinal obstruction is of a parasitic nature.

Ascariasis, like all other parasitoses, is a matter of Preventive Medicine and Medical Geography. In those countries where Hygiene and Public Health are prior concerns of their Governments, the incidence of complications of parasitoses is minimal, the report of isolated cases of intestinal obstruction being bibliographical wonders, whereas in tropical and subtropical countries it is frequent to find reports of dozens of cases.

The study of acute intestinal obstruction by *Ascaris*, performed at the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo allowed us to group the cases into four series:

Series I

A study was made of 18 subjects which bore intestinal obstruction by *Ascaris*: 9 (50%) were clinically treated with a mortality rate of 11.1%, and the other 9 underwent surgery with a mortality rate of 44.4%. In this period we gave preference to surgical proceedings.

Since mortality was high, we turned to the following procedure.

Series II

In this period the conservative treatment was used routinely. We operated only the complicated cases which showed no results by clinical treatment. Amongst 44 clinically treated cases, only 1 subject (2.2%) died in shock owing to the lateness in getting medical attendance. Amongst 6 who underwent surgery, 3 (50%) died, one of them on account of toxemia and two of shock.

Series III

After the advent of piperazine in therapy of ascariasis the complications of obstruction decreased in strength. Thus 132 subjects underwent clinical treatment with only 1 (0.7%) death by intestinal necrosis. Surgery was performed only 5 times. with no mortality.

Series IV

In the last 10 years 250 cases came to the First Aid Unit; 140 children had clinical treatment, and there was only 1 (0.7%) death caused by toxemia on arrival; 110 had complications and needed surgical operation, there being 27 (24.5%) deaths.

Since the opening of the Hospital das Clínicas (1945) until 1960 there is a register of 205 cases (CURTI) with 11 (5.3%) deaths, 7 (3.4%) pertaining to the surgical group and 4 (1.9%) to the clinical group. In the last 10 years (1961 to 1970) another 250 cases were attended to, 140 having had clinical treatment with 1 (0.7%) death, and 110 had surgical treatment with 27 (24.5%) deaths. The increase of surgical cases seems at a first glance to be nonsensical because the results took a turn to the worse in spite of the progress in the medical sciences, mortality increasing from a rate of 5.3 to one of 11.2%.

Until 1960 all the population of the State of São Paulo and even of many other states of Brazil converged to the Hospital das Clínicas. The decentralization of medical assistance, represented by the founding of other general and children's hospitals, child care centers and rehydration centers in all town districts of São Paulo, the number of intestinal obstruction bearers which came to the Hospital das Clínicas did not increase in proportion with the demographic index. To wit: whereas the annual means of assistance to children bearing intestinal obstruction by *Ascaris* was 13.6 a year until 1960, this means increased only to 25 during the next decade whereas the population of the State of São Paulo increased 1,000%. The increase of assistance in out-patient clinics and the spreading of knowledge as regards clinical treatment led to an increase in the number of cases of complicated intestinal obstruction by *Ascaris* which needed surgical treatment: 110 (44%) among 250 cases, applied to subjects whose condition was bad.

Mortality also increased because most part of the subjects came from other Units or Hospitals to the First Aid Unit, when it was noticed that the therapeutic management adopted was not successful (24.5%). On the contrary, most cases which came to us early had an optimal evolution (mortality rate only 0.7%).

RESUMO

Obstrução intestinal aguda por Ascaris. *Análise de* 455 *casos.*

Os Autores apresentam 455 casos de obstrução intestinal por *Ascaris lumbricoides* observados em crianças até 11 anos. Fazem a descrição do quadro clínico e radiológico salientando os elementos do diagnóstico diferencial dos casos simples e das complicações por volvulo, perfuração, necrose intestinal e peritonite. Apresentam as terapêuticas clínica e cirúrgica aplicadas e seus respectivos resultados.

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REFERENCES

1. AMATO Neto, V. — Helmintoses: conduta terapêutica. *Atualidades Médicas* **9**:22-42, 1973.

2. BOUCHIT, G.; L'AMEZEC, H.; JAFFRY, Y.; BOTTA, J. & HERNE, N. — Intestinal occlusion by ascarides. A propos of a case. *Bordeaux Chir.* **1**:35-37, 1962.

3. CARVALHEIRA, F. & SCHILLER, J. M. — Obstrução por ascaris na infância. *J. Pediat.* **14**:283-302, 1948.

4. CURTI, P. — Oclusão intestinal aguda por ascarides na criança. Considerações sobre 205 casos. *Rev. Hosp. Clin.* **16**:417-424, 1961.

5. DASMOHAPATRA, G.S.; MOHANTY, B. & PATNAIK, G. — Clinical appraisal of 200 cases of ascariasis with special reference to surgical complications. *J. Indian Med. Assoc.* **57**:284-288, 1971.

6. LAGROT, F.; GRECO, J. & LAVERGNE — Un cas d'ascaridiose chirurgicale. *Pediatrie* **14**:93-94, 1959.

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