

# CT of pelvic infection after Cesarean section

S. APTER (\*) - S. SHMAMANN (\*) - G. BEN-BARUCH (\*\*)  
Z. J. RUBINSTEIN (\*) - G. BARKAI (\*\*\*) - M. HERTZ (\*)

*Summary:* The CT findings in 6 women with puerperal sepsis after Cesarean section were reviewed. In four patients a right-sided mass was palpated. CT scan confirmed the diagnosis of Tubo-ovarian abscess in two of the patients, puerperal ovarian vein thrombosis (POVT) in the third and an enlarged adnexa with no signs of abscess formation in the fourth patient. The last two patients had normal adnexae but a large amount of gas in the uterus. All patients recovered after appropriate treatment.

In patients with severe puerperal sepsis who do not respond to antibiotic therapy, CT scanning of the abdomen and pelvis is useful. This study can demonstrate whether there is an abscess which requires surgical intervention or POVT which needs additional anticoagulant treatment.

*Key words:* CT; Infection Post Cesarean Section; Ovarian abscess; Uterine emphysema.

## INTRODUCTION

Computerized Tomography of the pelvis after uncomplicated vaginal delivery or Cesarean section (CS) has been described<sup>(1, 2)</sup>. However, we found only 2 reported cases with an infection complicating CS demonstrated by CT<sup>(3, 4)</sup>.

We present 6 patients with severe puerperal infection after CS, in whom the CT findings were essential in the management of the patients.

## MATERIALS AND METHODS

The clinical and CT findings of 6 women, who underwent abdominal and pelvic CT scans 3-21 days after CS with the clinical diagnosis of puerperal infection, were reviewed. All the patients were examined during a 5 year period from July 1985 to July 1990. During these years approximately 2500 women underwent CS in our hospital. All the patients were severely ill with fever and abdominal and pelvic tenderness.

They were treated with broad spectrum antibiotics without clinical improvement. A CT examination was requested in order to detect whether an intra-abdominal or pelvic abscess was present prior to surgical intervention.

## RESULTS

Table 1 presents the relevant clinical and CT findings. In all the patients the clinical pelvic examination was difficult due to an enlarged uterus and pelvic tenderness. However, in 4 patients a right adnexal mass was palpated.

---

(\*) From the Departments of Diagnostic Imaging and Obstetrics and Gynecology, The Chaim Sheba Medical Center, Affiliated to the Sackler Faculty of Medicine, Tel Aviv University, Israel

*All rights reserved* — No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, nor any information storage and retrieval system without written permission from the copyright owner.

Table 1. - CT and clinical findings in 6 patients with pelvic infection after Cesarean section.

Patient No.	Days post C-S	CT findings	Uterine dimensions in cm AP width length	Clinical details and outcome
1	10	Soft tissue mass Right adnexa	7 × 8 × 8	Recovery following antibiotic therapy
2	6	Soft tissue mass Right adnexa	9 × 13 × 10	Tubo-ovarian phlegmon at surgery
3	11	Soft tissue mass Right adnexa with air fluid levels and air bubbles in it	9 × 9 × 7	Abscess drained under CT guidance
4	12	Soft tissue mass Right adnexa with central tubular low density structure, into IVC* fluid filled uterus	8 × 8.5 × 5	Recovery following anticoagulant and antibiotic therapy, CT normal after 6 weeks
5	21	Intrauterine gas	7 × 11 × 7.5	Recovery following antibiotic therapy
6	3	Intrauterine, intraperitoneal and subcutaneous gas	11 × 7 × 10	Blood cultures grew Clostridium Welchii. Recovery following antibiotic therapy

(\*) IVC - inferior vena cava.

On CT scan a soft tissue mass was demonstrated in the right adnexa in 4 patients (Fig. 1, Case 1). In 2 of them fluid or air fluid levels within the mass represented an abscess which was treated surgically (Fig. 2, Case 3).

In the third the CT scan demonstrated a tubular structure with a low density center continuing upwards in the retroperitoneum and into the inferior vena cava indicating puerperal ovarian vein thrombosis (POVT) (Fig. 3, Case 4). This patient recovered after anticoagulants were added to the treatment. In the fourth, the mass did not contain any fluid or gas and therefore surgical intervention was deemed unnecessary. This patient recovered after a change in the antibiotic treatment.

In the last 2 patients the adnexae were normal but a large amount of gas was demonstrated in the uterus, localizing the infection to the uterus itself. These patients were treated by further antibiotics with full recovery (Fig. 4, Case 6).

#### DISCUSSION

Postoperative complications after Cesarean section are not rare. The most common one is endometritis occurring in 6-18% (5, 6). Most infections respond well to antibiotic therapy (7, 8). When severe pelvic infection persists, however, surgical intervention has to be considered. The pelvic examination in such patients is usually suboptimal due to marked tenderness and a large uterus. Abdominal ul-

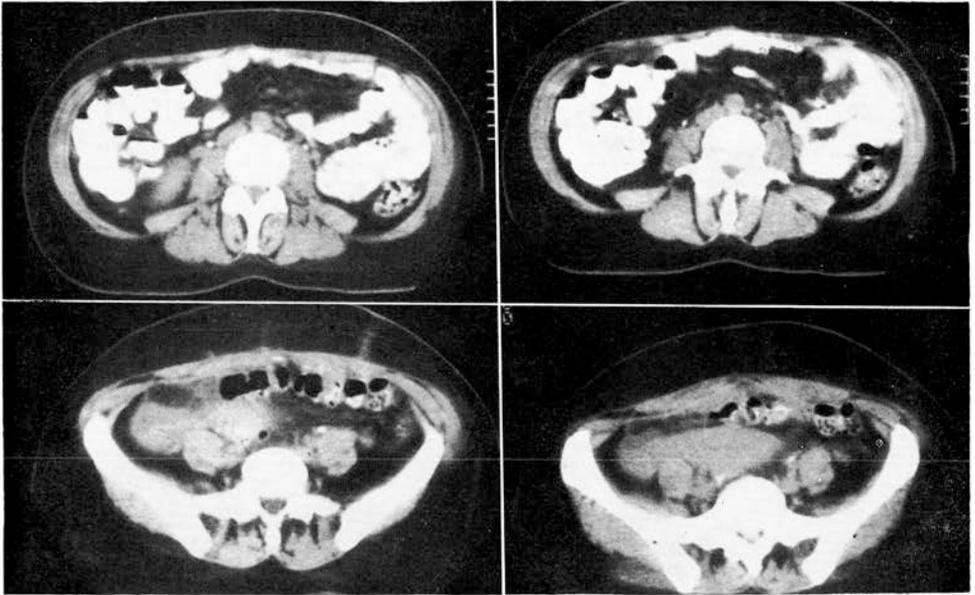
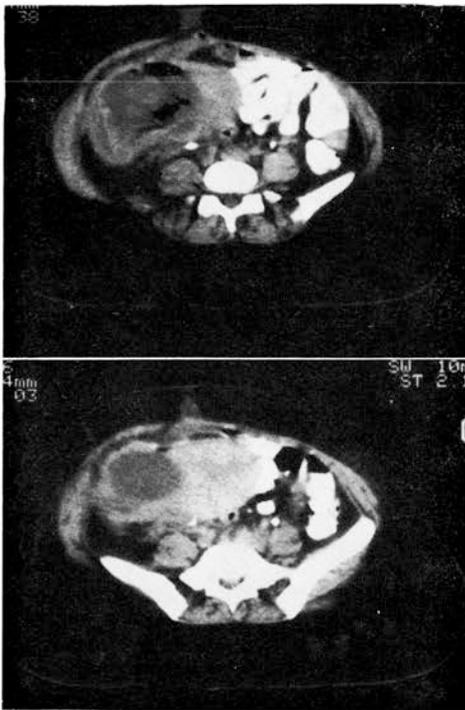


Fig. 1. — Case 1: Inflammatory process in right adnexa. Homogeneous soft tissue mass to right of the uterus. Four sequential scans showing also the opacified cecum cranial to the mass.



trasonic examination is difficult to perform after recent surgery. In this setting a CT scan of the abdomen and pelvis can assist in selecting those patients in whom surgery is beneficial.

On the CT scan an infectious process was demonstrated in the right adnexa in 4 of the patients and in the uterus in the other 2. In one of the 4, ovarian vein thrombosis was an additional finding. Such thrombosis has a well documented right-sided predominance, which is attributed to antegrade blood flow in the right ovarian vein, as opposed to retrograde flow in the left<sup>(10, 11, 12)</sup>. A similar mechanism can perhaps also account for the right-sidedness of the infectious process in the other patients. Any right-sided lower abdominal mass must be differentiated from a fluid filled cecum and therefore the cecum has to opacified with oral contrast<sup>(9)</sup> (Fig. 1).

Fig. 2. — Case 3: Right adnexal abscess. Right adnexal mass containing fluid and air fluid level.

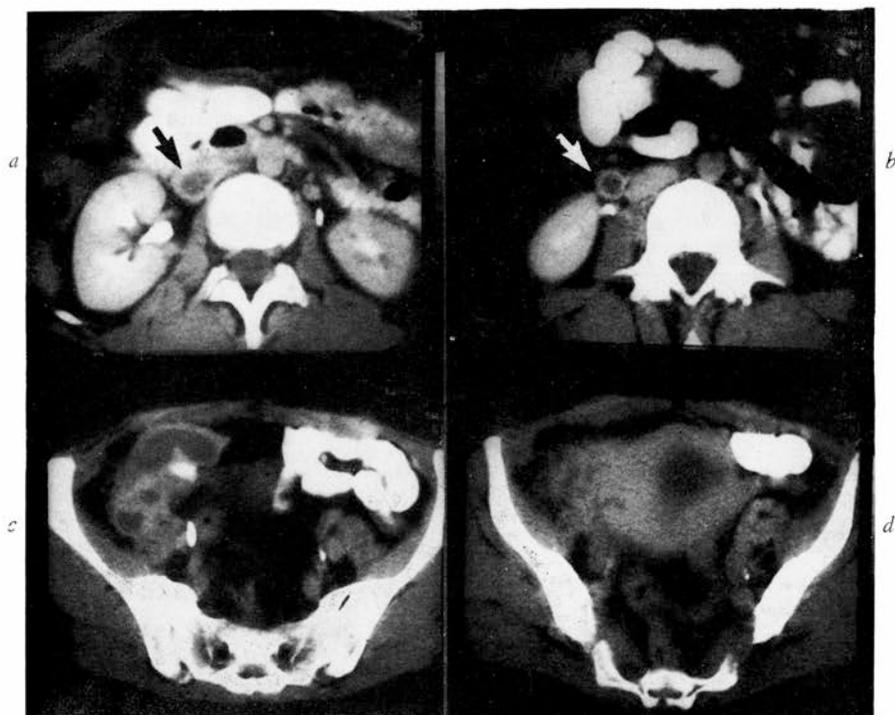


Fig. 3. — Case 4: Right puerperal ovarian vein thrombosis. CT scans at different levels of the pelvis: *a*) filling defect (arrow) in the inferior vena cava; *b*) filling defect (arrow) in dilated right ovarian vein; *c*) adnexal mass with low-density tubular structure within it; *d*) the adnexal mass seen to the right of a fluid filled uterus.

On CT scan, gas in the uterus is regarded by some authors as a normal finding in the early puerperium<sup>(1, 3)</sup>. However, in two of our patients intrauterine gas was associated with severe sepsis; this supports the statement made by Gross *et al.*<sup>(4)</sup> that intrauterine gas on CT, in the absence of pelvic malignancy indicates severe uterine infection.

To conclude, we suggest that a CT scan should be done in patients with se-

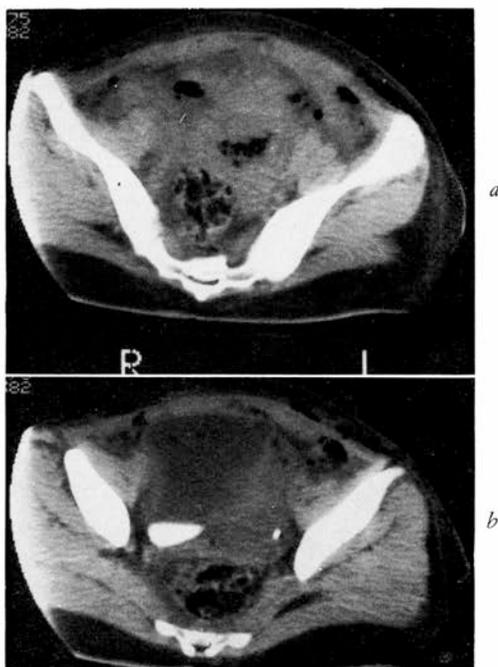


Fig. 4. — Case 6: Intrauterine abscess. Two scans at different levels of the pelvis: *a*) intrauterine and subcutaneous gas; *b*) Air bubbles in the right rectus abdominis muscle and in the peritoneal cavity.

vere puerperal infection which does not respond to the usual antibiotic treatment. This study can differentiate between an inflammatory mass treatable by antibiotics and an abscess which needs surgical intervention. In addition, CT scan can detect ovarian vein thrombosis indicating anticoagulation therapy. In all our patients the CT findings were useful in choosing the appropriate treatment.

#### REFERENCES

- 1) Garagiola D.M., Tarrer R.D., Gibson L., Rogers R.E., Wass J.L.: "Anatomic changes in the pelvis after uncomplicated vaginal delivery: a CT study on 14 women". *AJR*, 153, 1239, 1989.
- 2) Twickler D.M., Setiawan A.T., Harrell R.S., Brown C.E.L.: "CT appearance of the pelvis after Cesarean section". *AJR*, 156, 523, 1991.
- 3) Shaffer P.B., Johnson J.C., Bryan D., Fabri P.J.: "Diagnosis of ovarian vein thrombophlebitis by Computed Tomography". *Comput. Assist. Tomogr.*, 5, 436, 1981.
- 4) Gross B.H., Jafri S.Z.H., Glazer G.M.: "Significance of intrauterine gas demonstrated by computed tomography". *J. Comput. Assist. Tomogr.*, 7, 842, 1983.
- 5) Rogers R.E.: "Complications at Cesarean section". *Obst. Gyn. Clin. North Am.*, 15, 673, 1988.
- 6) Miller J.M.: "Maternal and neonatal morbidity and mortality in Cesarean section". *Obst. Gyn. Clin. North Am.*, 15, 629, 1988.
- 7) Petitti D.B.: "Maternal mortality and morbidity in Cesarean section". *Clin. Obst. Gyn.*, 28, 673, 1985.
- 8) Faro S.: "Infectious disease relations to Cesarean section". *Obst. Gyn. Clin. North Am.*, 15, 685, 1988.
- 9) Mueller P.R., Simeone J.F.: "Intra-abdominal abscesses diagnosis by sonography and computed tomography". *Radiol. Clin. North Am.*, 21, 425, 1983.
- 10) Angel J.L., Knuppel R.A.: "Computed tomography in diagnosis of puerperal ovarian vein thrombosis". *Obst. Gyn.*, 63, 61, 1984.
- 11) Munsick R.A., Gillanders L.A.: "A review of the syndrome of puerperal ovarian vein thrombophlebitis". *Obst. Gyn. Surv.*, 36, 57, 1984.
- 12) Jacoby W.T., Cohan R.H., Baker M.E., Leder R.A., Nadel S.N., Dunnick N.R.: "Ovarian vein thrombosis in oncology patients: CT detection and clinical significance". *AJR*, 155, 291, 1990.

Address reprints requests to:

S. APTER

Department of Diagnostic Imaging  
The Chaim Sheba Medical Center  
Tel Hashomer 52621, Israel