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Clinical Study of Multiple Intestinal Ulcerations and Perforations Caused by Methicillin-Resistant *Staphylococcus aureus* in Infants

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Purpose : In recent years, the authors experienced a distinctive clinical entity of multiple intestinal ulcerations and perforations in infants. The purpose of this study was to describe the clinical characteristics of this entity, examine th possible pathogenesis and the effective treatment.

Methods : Seven infants underwent abdominal exploration under suspicion of surgical abdomen and were noted to have multiple intestinal ulcerations and perforations without evidence of necrotizing enterocolitis by the members of the Korean Association of Pediatric Surgeons. The clinical courses, operative findings, bacterial cultures, pathologic findings, treatment and prognosis of these seven cases were evaluated retrospectively.

Results : The characteristics of this entity are as follows : The initial presenting symptoms were all different. Despite conservative treatment with a broad spectrum of antibiotics, diarrhea and abdominal distention developed and progressively grew worse. At laparotomy, all patients exhibited numerous typical transverse linear ulcerative lesions with pin-point perforations scattered mainly in the small bowel. Histologic evaluations of the resected specimens revealed mucosal ulcerations with neutrophil infiltration, submucosal microabscesses and colonies of gram-positive cocci. Methicillin-resistant *Staphylococcus aureus*(MRSA) was the predominant organism cultured from the body fluid. Only two cases, the completely-resected one and the one immediately treated with vancomycin after operation, survived.

Conclusion : We think this distinct clinical entity exhibiting multiple intestinal ulcerations and perforations is caused by MRSA occurring in infants. It has a high mortality because it is very

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difficult to diagnosis in young infants before laparotomy. Vancomycin is highly effective in treating MRSA, so we think the early diagnosis of this entity can make the treatment successful. (**J Korean Pediatr Soc 1999;42:77-87**)

Key Words : Methicillin-resistant *Staphylococcus aureus*(MRSA), Intestinal ulceration, Intestinal perforation, Vancomycin



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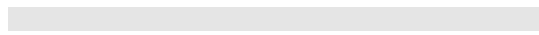
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(multiple intestinal ulcerations and perforations, MIUP)

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Table 1

Table 1. Clinical Summary of Multiple Intestinal Ulcerations and Perforations in Infants

Case (Age/sex)	Clinical features	Diagnosis on admission	Bacterial culture	Involved bowel	Surgery	Outcome
1.(40d/m)	fever, jaundice, diarrhea	CMV hepatitis	s(-), b(-), p(Sa/ E/ Pa), u(Sa)	small intestine	oversewing of ulcers	died
2.(45d/f)	diarrhea, abdominal distension	NEC	s(-), b(-), p(Sa/ Ef), bc(Sa/ Ef/ Sm), t(Sa/ Ef/ Sm)	small intestine	oversewing of ulcers	died
3.(51d/m)	jaundice, abdominal distension, malnutrition	CMV hepatitis	s(-), b(-), p(Sa/ Ec)	small intestine	complete resection	survived
4.(39d/m)	vomiting, hematochezia, abdominal distension	enteritis, sepsis	s(Sa), b(Sa), u(-)	small intestine	incomplete resection	died
5.(3d/f)	abdominal distention after operation of choledochal cyst	choledochal cyst	s(-),b(-), p(Sa/ Pa/ Ec), sy(Sa), u(-)	small and large intestine	incomplete resection	died
6.(46d/m)	diarrhea, vomiting, abdominal distension	chronic diarrhea, sepsis, malnutrition	b(-), s(-), p(Fi/ En/ Sa), g(Ec)	small intestine	oversewing of ulcers	died
7.(55d/m)	vomiting, diarrhea, fever, abdominal distension	small bowel stenosis	b(-), s(-), u(-), p(-), g(Ca)	small intestine	open and closure	survived

Abbreviated words

Specimen for bacterial culture; s :stool, b :blood, p :peritoneal fluid, u :urine, bc :bowel content, t :bowel tissue, sy : synovial fluid, g :gastric juice.

Result of bacterial culture; (Sa) :*Staphylococcus aureus*, (Ec) :*Escherichia coli*, (Pa) :*Pseudomonas aeruginosa*, (Ef) :*Enterococcus faecium*, (Sm) :*Stenotrophomonas(x) maltophilia*, (Fi) :*Flavobacterium indologenes*, (Enc) :*Enterobacter cloacae*, (Ca) :*Candida albicans*, (-) :no growth

(Treitz ligament)
 2-3mm 1m 1-2mm
 cefamezine(200
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 11
 (*Staphylococcus aureus*),
 (*Escherichia coli*), (*Pseudomonas ae-*
ruginosa) 4) 4(B , 1994 4 10)
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comycin(45mg/) tienam(160mg/) van- (methicillin-resistant *Staphylococcus aureus*, MRSA)가 1994 2

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46 40 3.6kg 25 3. 3 55

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3 Flavobacterium indologenes, Enterobacter cloacae, 가 , , , ,

7) 7(D , 1997 12 25) 가 가

55 40 3.6kg 20 ,

8 1) 1-2mm

Fig. 1 .

vancomycin(50mg/) ceftizoxime(240 mg/) 가 가 1, 5), cefotaxime(3) 가

(*Candida albicans*)가 microminocin(1), amikacin(2, 5, 7), gentamycin(3, 4, 6) 2) 가

B 7 4 5 B 1994 4 가

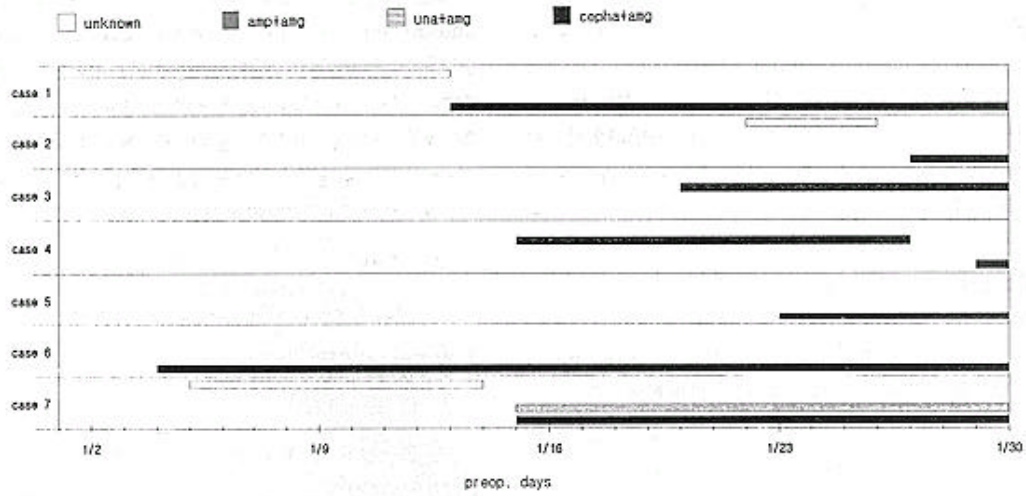


Fig. 1. The graph shows the different kinds of antibiotic regimens which were administered before operation in each case. Abbreviation: unknown(unknown regimen because it was administered at other hospitals), amp+amg (ampicillin and aminoglycoside), una+amg(unasyn and aminoglycoside), cepha+amg(cephalosporins and aminoglycoside).

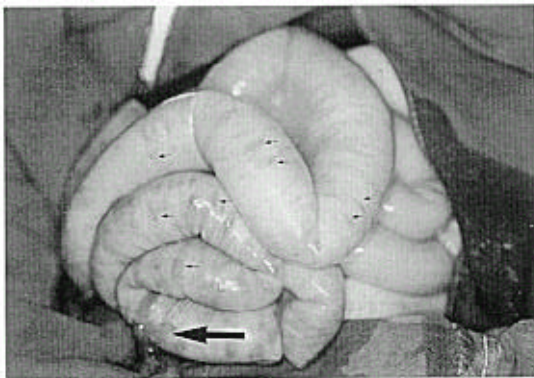


Fig. 2. An intraoperative photograph of case showing multiple transverse linear lesions (small arrows) scattered in the normal-appearing small bowel and one pin-point perforation (large arrow).

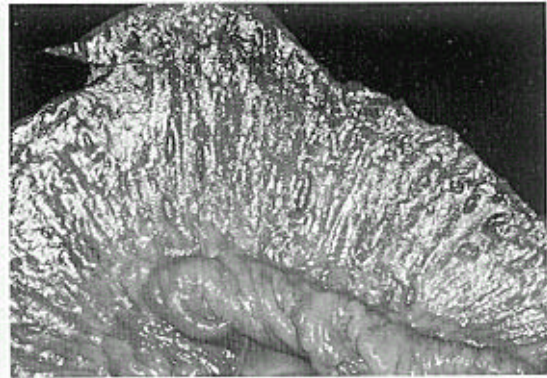


Fig. 3. A close-up photograph of mucosal surface showing multiple transverse elliptical ulcers along mucosal folds.

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(submucosal microabscess)

(Fig. 4). 2

(Fig. 5).



Fig. 4. A low-power view of a histologic section showing one submucosal abscess(A) and a developing mucosal ulcer(arrows)(H&E, original magnification ×40).

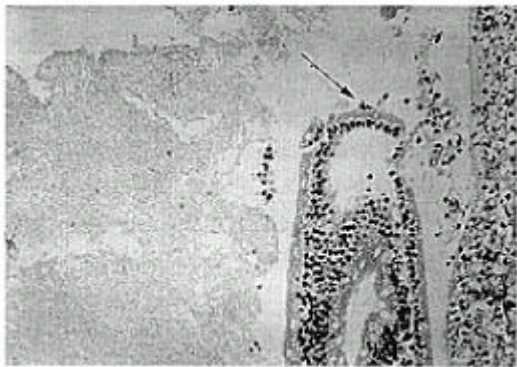


Fig. 5. A colony of gram-positive cocci(arrow) was detected in the ulcer(H&E, original magnification ×200).

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Shigeta (28)

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Scopetti

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Saito (15)

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