Dear Sir

The aim of the study was to investigate the prevalence of acute renal failure (ARF) in patients with severe acute pancreatitis (AP), and to evaluate the most important risk factors for ARF development and mortality.

During a 5-year period, 563 patients were admitted to the hospital with a diagnosis of AP. A retrospective analysis of the clinical, laboratory, and necroscopy data, including the occurrence of local and systemic complications, Ranson score during the first 48 h, presence and mode of renal replacement therapy in ARF patients, and outcome were recorded [1, 2]. The statistical significance of differences between the group means was determined by Student’s t test for unpaired samples. The significance of difference between sample frequencies was determined by the $\chi^2$ statistic. The significance level was set at $p < 0.05$.

Seventy-nine (14%) of the 563 patients with AP developed ARF during the course of the disease. There were 49 (62%) males and 30 (38%) females with ages ranging from 19 to 79 years (average 54.0 ± 15.2 years). Of the patients with ARF, only 3 (3.8%) had ARF alone. Other patients had additional failure of other organ systems, 52 (68.4%) of whom had multi-organ failure (MOF) before the onset of ARF. In only 7 (8.9%) patients with ARF was the renal system the first organ system to fail, 5 (7.14%) of whom had previously impaired renal function. Twelve (15.2%) of the ARF patients had systemic infection.

In table 1 the characteristics observed in the patients with AP and ARF are presented and compared with the group of subjects without ARF.

<table>
<thead>
<tr>
<th>CRF</th>
<th>MOF</th>
<th>ICU</th>
<th>ARF vs. non-ARF</th>
<th>ARF vs. non-ARF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic renal failure</td>
<td>Multi-organ failure</td>
<td>Intensive care unit</td>
<td>$p &lt; 0.05$</td>
<td>$p &lt; 0.001$</td>
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</table>

Of the individual organ system failures (OSFs) in ARF patients, failure of the cardiovascular (56.6%), pulmonary (51.3%), hematological (47.4%), gastrointestinal (28.9%), neurological (26.3%), and hepatic (11.8%) systems occurred. Combined ARF and failure of 4, 3, 2, or 1 organ systems occurred in 15.2, 22.8, 26.6 and 31.6% of patients, respectively. Only 3 (3.8%) patients...
all of the 33 patients with combined ARF and hematological failure had low platelet counts, 21% had anemia, 19.4% had leukopenia, and 22.2% had disseminated intravascular coagulation. Of the individual OSFs in patients without ARF, failure of the cardiovascular, pulmonary, hematological, gastrointestinal, hepatic, and neurological systems occurred in 2.5, 1.9, 1.7, 1.7, 1.4 and 0.8%, respectively. The incidence of all individual OSFs was significantly higher in patients with than without ARF (p < 0.001).

The non-surviving ARF patients were significantly older (60.9 ± 14.8 vs. 43.7 ± 14.8 years; p < 0.001), and had more preexisting chronic diseases (2.0 ± 1.2 vs. 0.8 ± 0.8 chronic diseases/patient; p < 0.001) than the patients without ARF. The Ransom score was significantly greater in the ARF patients (4.3 ± 1.3 vs. 2.9 ± 1.1; p < 0.01), and these patients had more (p < 0.05) local pancreatic complications (61%), like pancreatic necrosis, abscess, or pseudocyst, in relation to the patients with normal renal function (25%). Mortality increased with an increasing number of MOFs, and therefore it was significantly greater in the group of non-surviving patients than in the surviving patients (2.6 ± 1.1 vs. 1.0 ± 0.6 OSF/patient; p < 0.001).

All nonsurviving ARF patients were treated in the intensive care unit, but there was no difference in intensive care unit or hospital stay between surviving and non-surviving ARF patients. Renal replacement therapy was required in 49 (62%) ARF patients, but only 2 (4.1%) of them survived. One hemodialyzed ARF patient had no other OSF, and the other had hematological failure (thrombotic thrombocytopenic purpura). Both patients were young (19 and 30 years), and had no chronic diseases, systemic infection or any of the local pancreatic complications. The mean number of hemodialyses was 7 ± 4.2, and the recovery of renal function was complete. According to the results of the present study, ARF is a relatively common complication (14%) associated with a dismal prognosis in the patients with severe AP. ARF in AP patients is multifactorial and includes advanced age, hypovolemia with impaired renal perfusion, disseminated intravascular coagulation, systemic infection, preexisting chronic diseases, chronic renal failure, MOF, high Ranson score, local pancreatic complications, and poorly understood vascular and humoral events [1-5]. The majority of our ARF patients had cardiovascular, pulmonary or hematological failure, alone or in combination with other OSFs prior to development of ARF. The development of MOF in the course of ARF significantly increased mortality, and almost all patients with 2 or more OSFs did not survive. Similar to critically ill patients [6], hemodialysis treatment was associated with extremely high mortality in patients with ARF complicating severe AP [2]. The increased mortality in patients with AP and ARF requiring renal replacement therapy may be explained by a greater degree of severity of ARF (the nonoliguric form of ARF has a better prognosis than the oliguric form).

In conclusion, ARF is a relatively common complication of severe AP occurring late in the disease course, and mostly preceded by other OSFs. The prognosis of ARF in AP is extremely poor, especially in older patients with preexisting chronic diseases, MOF, and/or local pancreatic complications. Oliguric ARF patients requiring renal replacement therapy are especially at risk, and therefore prevention of MOFs and local pancreatic complications may reduce the later prevalence of ARF, and probably influence prognosis in patients with severe AP.

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References
Acute Renal Failure Complicating Severe Acute Pancreatitis
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