pyogenic abscesses. However, further observation with a large sample size is required to substantiate these findings.

Emergence of quinolones resistance in non-typhoidal *Salmonellae* has limited the choice of oral drugs for treatment of extra-intestinal infections. The mutational resistance to quinolones is promoted under selective pressure of these drugs, being used frequently in humans and animals. Enrofloxacin a fluoroquinolone used in animals can select out the Salmonella mutants, which are resistant to nalidixic acid and ciprofloxacin. Nalidixic acid has been extensively used in the developing countries for the treatment of bacillary dysentery, which led to the emergence of nalidixic acid resistance in *Shigella dysenteriae*.[1] Extensive use of nalidixic acid for the treatment of urinary tract infection and other infections can lead to the development of resistance to this drug among the normal coliform gut flora. All these factors could be together generating the selective pressure for emergence of quinolone resistance in non-typhoidal *Salmonellae*.

The increasing resistance to quinolones in non-typhoidal *Salmonellae* causing extra-intestinal infections calls for reduction in the selective pressure by restriction in use of these drugs and continuous surveillance on quinolones resistance in *Salmonellae*.

Received 15th February 2004. Accepted for publication in final form 28th March 2004.

From the Department of Infection Control and Microbiology (Panhotra), Department of Medicine (Saxena), and the Department of Community and Family Medicine (Al-Ghamdi), King Fahad Hospital, Al-Hofuf, Al-Hasa, Kingdom of Saudi Arabia. Address correspondence and reprint requests to Dr. Bodh R. Panhotra, Department of Infection Control and Microbiology, King Fahad Hospital, Al-Hofuf, Al-Hasa 31982, Kingdom of Saudi Arabia. Tel. +966 502910024 / (3) 575 0000 Ext. 1768. Fax. +966 (3) 575 5150. E-mail: drpanhotra2000@yahoo.co.in, drpanhotra30@hotmail.com

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Hemodialysis and ultrafiltration. *A bridge to cardiac surgery*

Thin M. Han, *FCP (SA), Cert. Nephrology (SA),*
Kevin Nankissor, *MBChB (Natal),*
Adrian Pearce, *MBChB (Wits), FCP (SA),*
Alain G. H. Assounga, *MD, PhD.*

Hemodialysis (HD), hemofiltration (HF) and ultrafiltration (UF) are being extended to non-renal applications such as end stage heart failure awaiting cardiac transplantation, liver failure, and drug over dose. We report on the increase of need for UF and HD in a chronic renal failure patient with severe acute heart failure following acute aortic regurgitation due to infective endocarditis. Here, we discuss the widening of the application of UF and HD related treatment in other specialties.

A 34-year-old white male was admitted to the hospital with a 2-day history of shortness of breath and cough productive of whitish sputum. Background history revealed that he was involved in a motor vehicle accident 10 years earlier causing damage to renal arteries and loss of kidneys, resulting in end stage renal failure. He was enrolled into the chronic hemodialysis program and was stable for 10 years on HD, via left radial arteriovenous fistula (3 times per week; 4 hours per session). On examination, he was pale, pyrexial and distressed. His blood pressure was 100/53 mm Hg and jugular venous pressure was elevated. He had 2/6-ejection systolic murmur at left sternal border and bi-basal crepitations. He was treated with intravenous cefuroxime, UF and HD. Five days later, a new murmur, 3/4 early diastolic murmur was detected at the lower left sternal border, associated with hypotension. There were no clinical stigmata of infective endocarditis. Echocardiogram showed vegetations on aortic valve with significant aortic regurgitation. One out of 3 blood cultures grew S*taphylococcus aureus*. He was put on intravenous vancomycin. However, he did not improve and subsequently he underwent successful aortic valve replacement surgery. While awaiting surgery, he was on alternate days UF and HD initially, there after he required daily dialysis support for his severe cardiac failure. Postoperatively, he was put back on his usual HD regimen of 3 times per week and remains well.

Ultrafiltration with HD is a useful procedure in patients with end-stage renal disease. Its usage has also been extending beyond renal indications as our case report illustrated where it was used as a bridging procedure to cardiac operation in acute cardiac decompensation whilst awaiting surgery. Vascular access in HD is at risk of infection. However, arterio-venous fistula, the safest of all vascular accesses was used in our patient. Endocarditis is rather uncommon in patients on dialysis despite a high risk of infection of vascular accesses. Ultrafiltration with HD used in our patient has been used successfully in various fields of medicine for different indications. In refractory cardiac failure, UF has been shown to be effective in treating patients with the New York Heart Association class III to IV congestive cardiac failure (CCF) and urine output less than 1000ml/day, resulting in symptomatic improvement and better quality of life.[1,2] Many neuroendocrine factors play a role in the pathogenesis of CCF. Norepinephrine, angiotensin II and arginine vasopressin activities are increased in CCF, leading to heightened systemic vascular resistance and further worsening of cardiac function. In advanced stage of CCF, conventional therapy using diuretics, vasodilators and inotropes becomes less effective. Treatment of refractory CCF appears to require a break in the neurohumoral hemodynamic vicious cycle. By doing UF, it not only provides fluid removal but also appears able to break this cycle. Canaud et al,[3] reported a case similar to our patient, in whom the UF with HD was used as a bridge until heart transplant surgery.[3]

In liver cirrhosis with intractable ascites, UF and HF are more and more used. Patients with end stage renal disease associated with hepatic cirrhosis are sometimes encountered in a HD unit. As liver decompensates, intractable ascites can be a problem. Traditionally, diuretics are used, however, these agents are not effective to maintain the fluid hemostasis in chronic renal failure patients. Therapeutic paracentesis and peritoneovenous shunts are alternative therapies for refractory cases; however, the long-term results are unsatisfactory. A major problem in managing these patients is the tendency for hypotension during UF. Hwang et al,[4] presented a patient with end stage renal disease on chronic HD and refractory ascites due to decompensated liver cirrhosis for which intermittent ascites UF was carried out using the same machine. Water content, but not all the components in the ascitic fluid was removed to relieve the intra-abdominal pressure. Albumin in the fluid is too large to be filtered through the hollow fibre membrane. The albumin concentration in fact was found to be approximately 3 times higher in the ascitic fluid post-UF than pre-UF concentration. No hemodynamic instability was found and the cost was the same as for ordinary HD.[4]

In acute liver failure and intracranial hypertension, UF is used in conjunction with mannitol as a therapy to control the intracranial hypertension. Increased intracranial pressure can occur as a complication in patients with acute liver failure. Mortality rate can be as high as 90% in those patients with hepatic encephalopathy. With orthotopic liver transplantation, up to 80% of patients can survive.[5] However, 30-40% of them die while waiting for the transplantation, mainly due to increased intracranial pressure.

During cardiac surgery, cardiopulmonary bypass (CPB) may cause an increase in serum cytokine levels and systemic inflammatory responses, which may trigger the onset of various types of postoperative organ failure.[6] Total body water is increased after CPB resulting in tissue edema and organ dysfunction. Onoe et al,[6] successfully reduced tissue edema by applying a modified ultrafiltration (MUF) in cases of adult cardiac surgery. In the MUF group, serum interleukin-8 (IL-8) was reduced significantly, whereas it did not change in the control group. Systemic blood pressure and hematocrit were found to be significantly increased in the MUF group, suggesting beneficial effects of MUF on postoperative hemodynamics. In patients with drug intoxication, various forms of dialysis (HD, UF, continuous veno venous hemodiafiltration [CVVHDF], continuous arteriovenous hemodiafiltration [CAVHDF] and HF) are used. Vancomycin, the antibiotic of choice for methicillin resistant staphylococcal infections can cause nephrotoxicity if used excessively. It can be effectively removed by high-flux HDF. Aspirin is a widely available drug, which requires no doctor's prescription. Continuous veno venous hemodiafiltration has been reported to be an effective form of therapy of severe and life threatening aspirin overdose.[7] Theophylline and carbamazepine overdose are also treated successfully in a similar way.[8] Lithium salts are commonly prescribed for treatment of bipolar affective disorder; they have a narrow therapeutic window. Overdose of lithium is treated increasingly with continuous renal replacement therapy (CVVHDF, CAVHDF) particularly in cases of chronic poisoning to minimize the rebound effects.[9]

For hypertension control, UF plays a significant role. It is generally agreed that hypertension in most patients on maintenance HD is due to volume overload and can be corrected by UF. In the early days of the dialysis treatment, hypertension could be corrected by UF. However, the percentage of patients responding to UF is not exactly known. Some reports suggest that only 5-10% of patients are refractory to UF. Ozkahya et al,[10] reported on 67 hemodialysis patients in whom UF was carried out during regular dialysis sessions and sometimes

applied additionally. Average blood pressure was found to be decreased from 173 ± 17/102 ± 9 mm Hg to 139 ± 18/86 ± 11 mm Hg after 6 months and to 118 ± 12/73 ± 6 mm Hg after 36 months. It has also been shown that hypertension can be better controlled with daily dialysis. Although long or frequent dialysis sessions may remove some uremic factors, which are responsible for the hypertension resulting in better blood pressure control, studies have shown that sufficient fluid removal is the most important factor in hypertension control.

This review demonstrates the contribution of dialysis related therapies in medicine. Our patient, and many other cases reported throughout the literature, highlight the usefulness of HD and UF procedures in managing patients, where conventional drug treatment is not adequate and surgery or other measures are not yet possible. From pure renal indications, dialysis related techniques have come of age to treat other conditions in general medicine. They should be made more widely available. Nephrologists should therefore be prepared to play a bigger role in the development of other specialties.

Received 9th February 2004. Accepted for publication in final form 27th March 2004.

From the Department of Medicine, University of Kwa Zulu Natal, South Africa. Address correspondence and reprint requests to Dr. Alain H. Assounga, Renal Clinic, Department of Medicine, Inkosi Albert Luthuli Central Hospital, Private Bag X03, Mayville 4058, Durban, Kwa Zulu/Natal, South Africa. Fax. +273 (12) 403514. E-mail: accoungaa@ukzn.ac.za

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Extrapyramidal syndrome after treatment of *falciparum malaria* with sulphadoxine-pyrimethamine

Ishag Adam, *MD,* ***Mustafa I. Elbashir,*** *MD, PhD.*

Occasionally unusual patterns of clinical presentations of falciparum malaria including neurological manifestations are seen in Sudan.[1] Chloroquine is no longer regarded the first line treatment for falciparum malaria, where more than 70% resistance to the drug was reported in the capital Khartoum and in the Eastern Sudan. Sulphadoxine-pyrimethamine (SP) is now the drug of choice for the treatment of uncomplicated falciparum malaria in Sudan.[2]

A 39-year-old male presented to the New Halfa Teaching Hospital, New Halfa, Sudan on 25th January 2004 complaining of fever, sweating, headache, nausea and backache for 3 days. His weight was 78 kg, he was fully conscious, his pulse was 85/minute, blood pressure 130/80 mm Hg, and temperature at 38.2°C, with a clear chest. There was no palpable spleen or liver. His hemoglobin was 11 g/dl. The blood film confirmed the diagnosis of falciparum malaria. He was given 3 tablets of SP, after 50 minutes, he developed a full picture of extrapyramidal manifestations (spasmodic torticollis, trismus and akathisia). He was admitted in the ward and received 10mg of intravenous diazepam, his condition improved with no sign of extrapyramidal manifestations. He was discharged on the second day, seen in the referred clinic after 2 weeks where he had been briefed on the extrapyramidal manifestations he developed and was advised not to take SP.

As the patient presented with the extrapyramidal syndrome 50 minutes after SP ingestion, it is tentative to assume the possibility that SP was the causal factor rather than the malaria, although malaria itself can rarely lead to extrapyramidal syndrome.[2-4] However, extrapyramidal manifestations were previously reported following quinine therapy,[4] and not SP. Nevertheless, it should be put in mind among odd clinical presentations of falciparum malaria, or its treatment as we reported recently.[5]