



ACUTE RENAL FAILURE IN THE ELDERLY

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Acute renal failure is a frequent disorder in the old population and the increased incidence of this renal syndrome in this age group is favoured by some factors such as the histological and functional changes of the aged kidney, the reduced capability of this population to metabolize drugs, and their exposure to polypharmacy and to a great number of systemic diseases such as diabetes mellitus, hypertension and cardiac failure¹. Among the main senile renal changes that make old people prone to acute renal failure we find:

a disturbance in the autoregulatory vascular defence²

a reduction in the number of glomeruli and glomerular capillaries²

their renal tubular frailty³

a salt and water wasting secondary to a reduced tubular reabsorption capability of these substances^{4, 5}

From the current evidence that nephrology and geriatrics have, the following “pearls” for the assessment and treatment of acute renal failure in the elderly can be delineated:

1) Acute renal failure is frequently multifactorial^{1, 6, 7}:

In fact multifactorial physiopathology is expected for acute renal failure in any age group. However, there are some etiologies that should be always ruled out in the aged patient:

- a) Real hypovolemia: dehydration, bleeding. This appears as the most frequent cause of acute renal failure in this population.
- b) Effective hypovolemia: cardiac failure, sepsis.
- c) Hemodynamically mediated pharmacological damage: non-steroidal anti-inflammatory drugs, angiotension converting enzyme inhibitors and angiotensin receptor blockers. These drugs worsen the altered autoregulation mechanism of the elderly.
- d) Acute Glomerulonephritis: crescentic disease.
- e) Acute Urinary Obstruction: intrarenal: urolithiasis.
- f) Drug-induced acute interstitial nephritis eg: nephritis induced by diuretics.
- g) Acute tubular necrosis: mediated by ischemia and/or nephrotoxicity (radio-contrast, aminoglycosides)
- h) Acute renal vascular obstruction by thrombosis or cholesterol embolization.

2) “Atypical” Presentation of the Disease:

In the elderly, the diseases usually have patterns of presentation different to the ones observed in the young population (paucisymptomatic). Signs and symptoms are frequently less defined in the age population. Moreover, any disease could appear merely as one of the entities known as the geriatrics giants : confusional syndrome, falls, immobility syndrome and acute urinary or fecal incontinence. These presentation patterns are called “atypical” but actually they are “typical” in this population^{8, 9, 10, 11}



3) Unreliable Physical Examination:

Some physical signs found in the physical examination in an old patient may make physicians to arrive to missinterpretations, for instance: dry mouth and skin, orthostatism and skin fold are all signs normally present in the healthy elderly not meaning necessary dehydration state. Moreover, the finding of edema in immobilized patients does not mean volume overload as well as the lack of thirst does not signify an absence of dehydration¹².

4) Tubular frailty:

This condition of the senile kidney predisposes aged people to develop acute tubular necrosis easily, even after a mild renal insult. Aging tubular cells may be more vulnerable to ischemic because cellular antioxidant defenses decline with age and oxidant injury may be a critical determinant of ischemic acute renal failure. Besides, it was also documented an increased propensity to vasoconstriction (to angiotensin II, endothelins and PAF) that may enhance susceptibility of old kidney to toxic substances¹³. Moreover the tubular recovery from the installed tubular necrosis is very slow. It may take more than the usual two weeks it takes young patients to recover. Even though this aged patients sometimes need dialysis till they begin their tubular recovery^{1, 3}.

5) Non-reliable urinary indices:

In the elderly, many urinary indices such as urinary sodium, fractional excretion of sodium (FENa), fractional excretion of urea (FEU), urinary osmolality should be read carefully. As renal physiology changes secondary to the ageing process make the expected values of these urinary indexes different from those in the young population. Taking a closer look, the characteristic reduced sodium and urea reabsorption and the reduced urinary concentration capability of this population make the FENa and FEU higher and the urinary osmolality lower respect to the ones reached by young people in renal hypoperfusion states. These altered index patterns can lead to an incorrect interpretation making an acute pre-renal failure look as a parenchymal one¹².

6) The intermediate syndrome pattern:

Due to the combined influence of the senile tubular frailty and tubular dysfunction, in old people is frequently observed the so called "intermediate syndrome", it means a patient suffering from a pre-renal acute renal failure who seems to be suffering from a parenchymal one since this old patient usually has not only high plasma urea and creatinine but also urinary indices compatible with acute tubular necrosis. However, they resolve the renal failure with volume expansion as a pre-renal insufficiency does. However, while the classical pre-renal failure recovers in 24-48 hours of rehydration, and intermediate syndrome does it in around a week¹⁴.

7) Prophylaxis:

To avoid situations that could damage the kidney is the best strategy against the consequences of the acute renal failure in this population. The following principles summarize these concepts:

Avoid nephrotoxic substances

Avoid polypharmacy

Prescribe low doses of drugs

Adjust drugs to the expected functional reduction of the senile kidney

Assess the renal function before and after the introduction in the therapeutic scheme of some drugs that could be potentially nephrotoxic³.

8) Rehydration: almost always and cautiously:

As in practically any acute renal failure in any age rehydration is crucial as the first therapeutic step.

This fact becomes more important in aged people since they are prone to volume contraction (primary hypodipsia and wasting of salt and water). It is crucial to highlight the importance of rehydration as a first therapeutic approach since it is not always easy to distinguish from laboratory tests between pre-renal failure secondary to dehydration and parenchymal renal failure as it has been mentioned above. However, since old people usually have rigid cardiac walls (diastolic cardiac failure) secondary to myocyte replacement by fibroblastic cells (pseudocardia), and they have a reduced glomerular filtration rate secondary to the ageing process, old people should be rehydrated cautiously because they are exposed to pulmonary edema during aggressive volume infusion¹².

9) Renal Biopsy and Dialysis

Principles and means for etiological diagnosis and acute renal failure treatment are the same in young and aged population. Renal biopsy does not carry a greater risk in the older patient than in the younger and it can be obtained adequate renal tissue in 80-95 %, with a complication rate of 2.2 – 9%. However, because of complex changes in the aged kidney or intercurrent diseases as arteriosclerosis or global sclerosis, the interpretation of the histological finding may be more difficult. There is no differences in the mortality between young and old patients suffering from acute renal failure^{7, 15}. Regarding the use of dialytic therapies in this population, in general this renal syndrome is treated equally in old people as in the young. Most elderly patients respond well to dialysis, either peritoneal or hemodialysis. Although large prospective studies have not compared the different dialysis strategies with respect to outcome in patients with acute renal failure, increasingly continuous extracorporeal therapies are recommended as an alternative to hemodialysis in the management of critically ill acute renal failure patient in the intensive care units. Even though the slow extended daily dialysis (SLED) modality may be particularly indicated in elderly, critically ill acute renal failure patients because these techniques combine the advantages of both continuous therapies and hemodialysis^{2, 16}.

CONCLUSION:

The acute renal failure in old people has its particular characteristics, and this knowledge is crucial for an optimal handling of this renal syndrome.



REFERENCES

- 1.- Lameire N, Nelde A, Hoeben H, Vanholder R. Acute renal failure in the elderly. In Oreopoulos D, Hazzard W, Luke R (Eds). *Nephrology and Geriatrics integrated*. Dordrecht. Kluwer Academic Publishers. 2000: 93-111
- 2.- Hernando Avendaño L, Lopez Novoa J. Glomerular filtration and renal blood flow in the aged. In Macías Núñez JF, Cameron S (Eds). *Renal function and disease in the elderly*. London. Butterworth, 1987;27-48.
- 3.- Musso CG. Geriatric nephrology and the “nephrogeriatric giants”. *Int Urol Nephrol*. 2002;34:255-256.
- 4.- Macías Núñez JF, García Iglesias C, Bondía Román A, Rodríguez Commes JL, Corbacho Becerra L, Tabernero Romo JM, De Castro del Pozo S. Renal handling of sodium in old people: a functional study. *Age and ageing*, 1978;7:178-181
- 5.- Musso CG, Fainstein I, Kaplan R, Macías Núñez JF. Función tubular renal en el muy anciano. *Rev Esp Ger*. 2004 (in press)
- 6.- Macías Núñez JF, Sanchez Tomero JA. Acute renal failure in old people. In Macías Núñez JF, Cameron S (Eds). *Renal function and disease in the elderly*. London. Butterworth, 1987;461-484.
- 7.- Pascual J, Oróñez O, Liaño F. Acute Renal Failure in the elderly. In Liaño F, Pascual J. (Eds). *Acute Renal Failure*. Barcelona. Masson. 2000:369-382.
- 8.- Perez Almeida E, Blanco Pascual E. The patient with immobility syndrome. In Macías Núñez JF, Guillén Llera FG, Ribera Casado JM (Eds). *Geriatrics from the bigining*. Barcelona. Editorial Glosa, 2000;135-152
- 9.- Verdejo Bravo C. The patient with incontinente síndrome. In Macías Núñez JF, Guillén Llera FG, Ribera Casado JM (Eds). *Geriatrics from the bigining*. Barcelona. Editorial Glosa, 2000;153-165
- 10.- Lázaro del Nogal M. The patient with gait disorders and falls. In Macías Núñez JF, Guillén Llera FG, Ribera Casado JM (Eds). *Geriatrics from the bigining*. Barcelona. Editorial Glosa, 2000;166-182
- 11.- Gil Gregorio P. The patient with psychiatric alterations. In Macías Núñez JF, Guillén Llera FG, Ribera Casado JM (Eds). *Geriatrics from the bigining*. Barcelona. Editorial Glosa, 2000;183-202
- 12.- Musso CG, Macías Núñez JF. The aged kidney: structure and function. Main nephropaties. In Salgado A, Guillén Llera FG, Ruipérez I (Eds). *Geriatrics from the bigining*. Barcelona. Masson, 2000;399-412
- 13.- Jerkic M, Vojvodic S, Lopez-Novoa JM. The mechanism of increased renal susceptibility to toxic substances in the elderly. Part I. The role of increased vasoconstriction. *Int Urol Nephrol*. 2001;32:539-47. Available from: <http://www.kluweronline.com/article.asp?PIPS=333016&PDF=1>
- 14.- Musso CG, Liakopoulos V, Ioannidis I, Eleftheriadis T, Stefanidis I. Acute renal failure in the elderly: particular characteristics. *Int Urol Nephrol*. 2006;38(3-4):787-93.
- 15.- Neild GH. Multi-organ renal failure in the elderly. *Int Urol Nephrol*. 2001;32:559-65
- 16.- Van de Noortgate N, Verbeke F, Dhondt A, Colardijn F, Van Biesen W, Vanholder R, Lameire N. The dialytic management of acute renal failure in the elderly. *Semin Dial*. 2002;15:127-32.