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ACUTE RENAL FAILURE IN THE ELDERLY: PEARLS FOR ITS ASSESSMENT AND TREATMENT.

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ABSTRACT

Acute renal failure (ARF) is a frequent disorder in the elderly, and this phenomenon is due to the senescence process, reduced metabolism of drugs, increased exposure to polypharmacy and systemic diseases of the aged group. The following are the main characteristics of the ARF in the elderly: multifactorial, atypical presentation, tubular frailty, intermediate syndrome pattern, low reliable physical examination and urinary incontinence. Prophylaxis and rehydration are the best treatments for ARF in the old population. Renal biopsy and dialysis have the same role in young and old people.

RESUMEN:

INSUFICIENCIA RENAL AGUDA EN EL ANCIANO. CONSIDERACIONES ACERCA DE SU VALORACIÓN Y TRATAMIENTO.

La insuficiencia renal aguda (IRA) es un trastorno frecuente en los ancianos a raíz de la senescencia renal, la menor metabolización de los fármacos y la mayor exposición a la polifarmacia y enfermedades sistémicas que ellos padecen. Las siguientes son las principales características de la IRA en el anciano: carácter multifactorial, presentación clínica atípica, fragilidad tubular, patrón de síndrome intermedio y poca fiabilidad del examen físico y de los índices urinarios en la interpretación de su etiología. Las medidas de profilaxis y rehidratación siguen siendo los mejores tratamientos de la IRA en el geronte. La biopsia renal y la diálisis tienen el mismo rol tanto en el grupo senil como en el joven.

INTRODUCTION

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 capillaries ²
- 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:

1. Real hypovolemia: dehydration, bleeding. This appears as the most frequent cause of acute renal failure in this population.
2. Effective hypovolemia: cardiac failure, sepsis.
3. Hemodynamically mediated pharmacological damage: non-steroidal anti-inflammatory drugs, angiotensin converting enzyme inhibitors and angiotensin receptor blockers. These drugs worsen the altered autoregulation mechanism of the elderly.
4. Acute Glomerulonephritis: crescentic disease.
5. Acute Urinary Obstruction: intrarenal: urolithiasis.
6. Drug-induced acute interstitial nephritis eg: nephritis induced by diuretics.

7. Acute tubular necrosis: mediated by ischemia and/or nephrotoxicity (radio-contrast, aminoglycosides)
8. Acute renal vascular obstruction by thrombosis or cholesterol embolization.

II) "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}

III) 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.

IV) 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. Beside, 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}.

V) 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.

VI) The intermediate syndrome pattern:

Due to the convined 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.

VII) Profilaxis:

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 therapeutical scheme of some drugs that could be potentially nephrotoxic³.

VIII) Rehydration: almost always and cautiously:

As in practically any acute renal failure in any age rehydration is crucial as the first therapeutical 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 therapeutical 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 original myocytes replacement by fibroblastic cells (presbicaardia), 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.

IX) 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 dialytical 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 (SLEDD) 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 Macias Nuñez 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 Combes JL, Corbacho Becerra L, Taberero 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, Luque K, Reynaldi J, Pidoux R, Greloni G, Algranati L. Intermediate Syndrome: a typical pattern of acute renal failure in the elderly. *Electron J Biomed* 2004;3:33-35. Available at: <http://biomed.uninet.edu/2004/n3/musso-en.html>

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.

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Elderly people in western populations are a demographic and medical fact and it could not be different in nephrology. An important growth in chronic renal failure (CRF) prevalence and acute renal failure (ARF) incidence can be observed in this area. However, to be an ancient does not really mean to have renal failure. Nowadays, the definition of ancient people is divided in two groups, the "young-elderly" (between 65-75 years-old) and "elderly-elderly" (75-80 years-old)¹ and it is in those both groups, where the renal function that maintains an equilibrium in normal circumstances, have difficulties adapting to challenges² (hypovolemia, associated drugs, nephrotoxics...). Besides the knowledge of risk factors for ARF development (diabetes mellitus, CRF, heart failure, liver pathology...), the knowledge of histological and functional changes described in this article is important to understand the "ageing kidney" and his sometimes atypical behaviour. To have in mind this "pearls" when we are taking care of our ancients will be able to avoid complications as ARF, a frequent pathology with a high mortality³

1.- Juan F. Macias-Nuñez and J. Stewart Cameron. The ageing kidney. In: Davison A, Cameron JS, Grunfeld JP, Ypersele CV, Ritz E, Winearls C Eds. *Oxford Textbook of Clinical Nephrology.* Third Edition. Section 1(1.5). 2005.

2.- Funiano G. et al.: Renal hemodynamic response to maximal vasodilating stimulus in healthy older subjects. *Kidney Int* 2001, 59:1052-1058.

3.- Thadhani R, Pascual M, Bonventre JV: Medical progress –Acute Renal Failure-. *N Engl J Med.* 1996; 334:1448-1460. Review.

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We are attending a progressive aging of the population that affects not only Europe and North America, but also many developing countries, in special, to those of Latin America. In Spain, the population with more than 65 years constitutes already more of 17% of the total and consumes more of 30% of medicines given through the National System of Health¹. These people usually take between one and two medicines of average, that can reach five if the self-medication is considered.

Elderly renal physiology differs from the adult one, and it contributes to the old people susceptibility to develop acute renal failure, but that cannot be considered pathological, causes that their sensitivity to medicines is superior. In this article, Musso reviews fundamental aspects of

the acute and chronic renal insufficiency in the elderly peoples, including their treatment.

REFERENCES

- 1.- Palop Larrea V, Martinez Mir, F: Adherencia al tratamiento en el paciente anciano. Inf Ter Sist Nac Salud, 2004;28:113-120
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The life expectancy has risen in the past 100 years with the predominance of elderly patients. The aging kidney is characterized by modifications resulting from organic and functional disturbances conditions leading to the loss of renal function. Musso describe correctly the pathophysiological changes suffered by the aged kidney that expose the elderly to develop acute renal failure. The hydration is the first treatment for any acute renal failure but one should be cautious in these patients because suffering reduced cardiac reserve. It also points out that the best strategy against the consequences of the acute renal failure in these patients is avoiding situations that potentially can damage the kidney.

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