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Bladder Cancer

Working Capacity and Well-Being after Radical Cystectomy with Continent Cutaneous Diversion

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Abstract

Objectives: The primary aim was to compare the working capacity in patients with continent urinary diversion with a control group. Secondary aims were to assess the changes in electrolyte and acid-base homeostasis and the functional status during strenuous physical activity, and finally, the well-being in the two groups.
Methods: Eleven patients who had undergone radical cystectomy and continent cutaneous diversion using an ileocolonic segment participated. The control group consisted of 12 men, matched for age and activity level. Working capacity was assessed by ergospirometry on an exercise bicycle. Venous blood samples were taken before the test, when the expiratory exchange ratio (RER) was about 1.0 and immediately after completion of the test. SF-36 was used to evaluate the subject's functional status and well-being.
Results: The median working capacity in the patient group was 155 (85–190) W and 155 (125–215) W in the control group (n.s.) corresponding to 72 (43–97) % and 80 (59–97) % respectively of predicted values. Peak oxygen uptake was somewhat low in both groups when compared to P-O Åstrands norms. Blood tests revealed that patients developed a slight metabolic hyperchloremic acidosis, not seen in the control group. There were no differences between the groups as assessed with SF-36.
Conclusion: Patients with a continent urinary diversion have a working capacity equal to a control group despite a slight metabolic hyperchloremic acidosis. Quality of life was similar in the two groups and corresponded well with the norms for the general Swedish population aged 65 to 74.

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1. Introduction

The gold standard for treating muscle invasive bladder carcinoma is radical cystectomy and, in suitable patients, continent reconstruction of the lower urinary tract, i.e. orthotopic bladder substitution or continent cutaneous diversion [1].

Much attention has been paid to the metabolic consequences of the incorporation of an intestinal segment in the urinary tract [2]. Long-term observation has not revealed any severe metabolic or nutritional effects providing renal function is normal. However, patients with large intestinal segments incorporated in the urinary tract show a respiratory compensation of a hyperchloremic metabolic acidosis [3,4]. The pathophysiology behind the hyperchloremic acidosis is mostly reabsorption of ammonium from urine through the intestinal mucosa, while secretion of bicarbonate adds only minimally to the acid load [4].

All studies on metabolic aspects in patients with various types of lower urinary tract reconstructions have been carried out with the patients at rest and no studies have to our knowledge been performed in order to investigate if the metabolic situation changes when the patients is exposed to strenuous physical activity.

A number of studies have been performed on quality of life after radical cystectomy. These have, in general, failed to confirm superiority of one type of diversion over others [5]. Common for all findings are psychosocial and sexual problems [6].

It may be hypothesised that the patients with a mild hyperchloremic metabolic acidosis with a tendency to respiratory compensation have utilised parts of their buffering capacity to maintain a stable pH in blood and therefore may have a reduced working capacity due to decreased remaining buffer capacity.

The primary aim of the present study was to assess the working capacity in patients with reconstructed lower urinary tracts, and to compare these results with a control group. Secondary aims were to assess the changes in electrolyte and acid-base homeostasis and the functional status and well-being in the two groups.

2. Patients and methods

The study protocol was approved by the local ethics committee.

2.1. Subjects

Patients eligible for inclusion were men below 80 years of age with at least 12 months follow-up after radical cystectomy and continent cutaneous diversion using a modification of the Indiana Pouch [7]; i.e. the Lundiana Pouch [8,9]. They should have no signs of recurring malignancy, have no diabetes, and be able to perform the test for musculoskeletal, cardiac, and pulmonary reasons. With a statistical power at 80% and a difference in 50 W between patients and a control group, and a standard deviation of 40 W, 12 persons were needed in both groups. Fourteen male patients were invited and gave written consent to participate. A control group consisting of thirteen men, regarding themselves as healthy, was arbitrarily chosen and matched for age, and activity level. Eleven patients and 12 controls completed the tests. Two patients could not fulfil the test, one of them due to heart condition and one due to discomfort with the face mask. One of the subjects in the control group (CG) was excluded because of too high blood pressure and one patient was excluded since the blood analysis showed a pathologic value (Table 1).

2.2. Ergospirometry

To assess working capacity the Oxycon Champion Ergospirometer™ (Jaeger, Breda, The Netherlands) was used for the gas analysis. During the test, performed on an exercise bicycle (Ergomed 940™; Siemens AB, Upplands Väsby, Sweden), patients wore a tightly sealed breathing mask. Each subject started at a load of 50 W on the bicycle, and the load was increased by 5 W each 30 s. Patients were instructed to maintain the same speed throughout the test. The maximum working capacity was measured in watts. The flow of air during inspiration and expiration was continuously measured and the apparatus automatically calculated the rate of oxygen uptake (VO_2) and carbon dioxide elimination (VCO_2). Point of crossing (PX), which is the level of VO_2 at which the respiratory exchange ratio (RER) = 1.0, was taken as a measure of the anaerobic threshold [10]. The values were expressed in VO_2 ml kg^{-1} min^{-1} and in % of peak VO_2. Oxygen uptake was calculated at PX with blinded data.

The subjects were connected to a computerised 12-led electrocardiogram (ECG) (Siemens Elema ECG megachart™). The ECG signal was fed into a computer. Blood pressure was measured manually. Rating of perceived exertion (RPE) using Borg scale (6–20 $Borg_{max}$), was performed every 2 min during the test [11].

2.3. Blood and urinary analysis

Venous blood sampling was performed through a Venflon® tube before the test, when RER was about 1.0 and at completion of the test. The plasma levels of sodium, potassium, chloride, lactate, calcium, and creatinine were measured as well as venous base excess and lactate.

Urine was collected just before the test on the bicycle and immediately after and was analysed for pH with indicator method.

2.4. Quality of life

The International Quality of Life (QoL) Assessment SF-36 Standard Swedish Version 1.0 was used to evaluate the