

# Direct Infusion of Coconut Water

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## Abstract

*The use of coconut water as a form of infusion therapy has been limited to the under-privileged countries. It has been so utilised mainly as a cheap and readily available source of fluid containing the requisite electrolytes. Hitherto, infusion of the water was carried out only after considerable prior treatment. This paper describes a method of direct infusion of the water from the fruit into the patient and presents the clinical impression of its use in 15 surgical cases treated in areas with no available facilities.*

## Introduction:

THIS PAPER describes a highly interesting and as yet unrecorded method of direct infusion of water from the fruit into vein without any preliminary preparation. Clinical experience suggest it to be an adequate substitutive therapy in unprivileged areas where any form of ancillary clinical help, diagnostic or therapeutic are not available.

## Materials and Methods:

A review of the literature reveal its use hitherto be limited in cases with chlorodiarrhoeas, nutritional oedemas, and deficiency diseases<sup>3,5,6</sup>. This series comprise of 15 post-operative cases (Table I), where clinical ion deficiencies were suspected. All patients suffering from undue weakness, apathy, fatigue, anorexia and intestinal ileus approximately 36 hours post-operative were suspected of ionic deficiency.

Preoperatively, all the cases were found to be grossly underweight and malnourished. Mild to moderate degree of dehydration was found to

**Table I**  
**Case Material**

Cl. Diagnosis	Operation	No.
Gastric Ulcer	Gastrectomy	1
Pylorio stenosis from duodenal ulcer	Vagotomy with bypass	7
Tuberculosis of ileum	Intestinal resection	2
Intestinal fibrosis	Release of obstruction bands	2
Intestinal obstruction	Laporotomy with resection	2
Multiple injury	Disarticulation knee	1
Total		15

coexist in 13 of the cases. Clinically, this was assessed by dryness of the mucosa, laxity of skin and by the tension of the eyeball. Replacement of fluid by infusion with 5% dextrose on normal saline were commenced in all these cases before surgery. Nasogastric suction was instituted post operatively in all cases.

Of the cases with pyloric stenosis, visible left to right epigastric peristaltic waves were easily discernible in five cases. These cases with three others with intestinal obstruction had associated recurrent bouts of vomiting.

All but one were male subjects.

Four abdominal surgeries and one knee disarticulation were done under infiltration anaesthesia.

The case materials are obtained from Bon-Hooghly Hospital, W. Bengal, India and from district hospital, Raub, Malaysia.

Facilities for biochemical estimation of serum electrolytes were sadly absent from these hospitals. Hence they were not performed in any of the cases. All cases received only a single infusion (590 mls. approx) into the cubital vein. Intradermal hypersensitivity test were not performed nor did any of them receive an antihistamine cover<sup>3</sup>. Subsequent replacement was done by using normal saline or 5% dextrose infusions, the only available product.

#### Technique:

Commercially available young green coconuts between the ages of 5-6 months were chosen. All the coconuts used were of the commonly available variety *Cocos Nucifera*. No deliberate attempt at selection was made though fruits with suspected cracks were rejected for fear of infection. Strips of husk are raised on either sides of the fruits, as is done by the local vendor, and tied into a knot. This is reinforced with strapping and the loop used for suspension. The surface of the coconut is sterilised with surgical spirit or tincture of iodine and with a knife similarly treated slices of husk are removed until the resilient inner shell is exposed. Using a large gauge sterile needle, a preliminary puncture is made and some of the fluid emerging under pressure is allowed to escape.

The needle is then withdrawn, the infusion needle inserted in its place and infusion commenced.

#### Results:

**Pyrexia:** Transient pyrexia rising upto 100.4F was recorded in six cases. As this was observed to abate shortly after discontinuing the infusion all subsequent infusion were allowed to run in completely with no adverse effects.

**Painful Vein:** - In three of the initial cases intense pain along the infusion vein was noted. A correlation between the rate of infusion and severity of pain was detected. The pain disappeared when infusion rate was regulated to between 40 and 60 drops/min. At or above 90 drops/min. the symptom recurred.

**Blocked infusion:-** In two initial cases, the infusion needle within the fruit was found to be blocked with particulate matters encountered, during the puncture. The preliminary puncture with a needle of a slightly larger gauge was found to circumvent this difficulty.

One of the two fruits collected from the same tree spontaneously burst with mild explosion when attempting the preliminary puncture. From the remnant of the fluid no evidence of fermentation could be detected. No explanation can be offered at the moment.

**Clinical Response:-** The high concentration of K ion raises the possibility of Potassium intoxication. Hence, this therapy was commenced only when the 24 hour urinary output was 1000 mls. or more. No harmful effects occurred.

A diuretic effect, as evidenced by an increase in the 24 hour urinary output by 150 to 350 mls. following the infusion, was noted in seven of the cases and the ecuritic diuretic<sup>3</sup> effect as may be feared following the infusion of a fluid with high concentration of potassium was not observed in any of the cases.

In assessing the value of this therapy in 9 cases (60%), clinically beneficial effect as indicated by feeling a sense of well being, reduction in abdominal distension and return of peristalsis within 24 hours of receiving this treatment, was gained. The remaining 6 cases did not show any appreciable clinical changes. Perhaps, the presence of adequate number of trained nursing personnel may have helped to obtain more complete data.

Table II

Composition of Coconut Water in West Malaysia

Volume	—	590 ml.
PH	—	4.8
Specific gravity	—	1.019
Calcium	—	13.1 mEq/L
Magnesium	—	4.7 mEq/L
Sodium	—	4.0 mEq/L
Chloride	—	41.0 mEq/L
Potassium	—	35.1 mEq/L
Sugar (Total)	—	2.8 gm/100 ml
Inorganic phosphates	—	4.0 mg/100 ml
Protein	—	0.269 gm/100 ml

#### Comment:

It is of interest to remember that a coconut closely simulates an egg. From a coconut fruit grows the future coconut tree. It seem therefore reasonable to believe that nature must put into

coconut water substances vital for generation of life. The close affinity of the chemical constituents of the coconut water to the intracellular fluid in man<sup>4</sup> testify to this.

The biological effects of coconut water has been studied in considerable detail both experimentally<sup>6</sup> and in patients<sup>3,5,6,7</sup>. The high concentration of potassium, physiologically balanced by a comparably high concentration of magnesium<sup>3,6,7</sup> together with the added presence of carbohydrate in the form of glucose and fructose<sup>3,7</sup> protein in the form of amino acids<sup>5,6</sup> Vitamin B<sup>6</sup> and mannitol<sup>3</sup> have sporadically prompted physicians in the less privileged countries within the tropical and sub-tropical belt<sup>3,7</sup> to utilise this fluid as a form of therapy. It has been so used, orally<sup>6</sup>, hypodermically<sup>6</sup> and by intravenous route<sup>3,4,6,7</sup>. For intravenous purposes, the water is collected aseptically by suction<sup>6</sup> or decantation<sup>4,7</sup> then filtered for particulate matters through layers of sterile gauze,<sup>3,4,7</sup> sterilised in autoclave<sup>3</sup> and treated with penicillin prior to infusion<sup>3</sup>. No such prior treatment was necessary in this series.

The favourable clinical response to coconut water therapy as opposed to those of glucose saline and synthetic coconut water infusion is well recorded<sup>1</sup> and its utilisation as a readily available source for K ion has been advocated<sup>2</sup>. In veterinary practice this has proved to be a basis of an effective yet economical mode of therapy<sup>8,9</sup>.

The increasing awareness of the effect of parental replacement of 'salt and water' in the successful management of patients, presents additional problems of adequate laboratory facilities and financial expenditure to the profession among the less privileged societies. A wider acceptance of this therapy may help curtail some of these demands without compromising the basic tenets of infusion therapy.

A similar acceptance of direct coconut water infusion in time of emergencies as with the unprecedented cyclones of East Bengal (1970) and the recurrent typhoons of the Philippines, can well provide a safe and adequate substitute for the more sophisticated and expensive form of infusion therapy.

It is submitted that the result of the study now provide a basis for a research protocol, designed to collect data for the study of various parameters, to help put this on a more scientific footing.

### Summary

A technique of direct infusion of coconut water is described. The overall impression of its use has been encouraging. A plea for its wider adoption is made.

It is believed that a similar trial with direct infusion has not been reported before.

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