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Original Research Article

ALBUMIN VERSUS FRESH FROZEN PLASMA IN MANAGING DIURETIC RESISTANT EDEMA IN CHILDREN WITH IDIOPATHIC NEPHROTIC SYNDROME

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Abstract

Background: This study was carried out to compare the efficacy and outcome of albumin with fresh frozen plasma (FFP) in the treatment of diuretic resistant edema in nephrotic syndrome

Methods: Sixty patients with idiopathic NS were enrolled in this prospective analytic study. Patients with moderate to severe edema with serum albumin <1.5 gm/dl were given albumin and FFP dividing into two groups. Group-A, received intravenous albumin- 1 gm/kg/day and Group-B intravenous FFP 15ml/kg/day. Total number of albumin and FFP infusion were determined by edema reduction.

Results: Diagnosis of NS and biochemical parameters were same in both groups. Dry weight was achieved in Group-A in 6.62± 3.15 days and in Group-B 6.65 ± 3.18 days. In GroupA the number of albumin infusion required was 1.42±0.62 and Group-B FFP infusion required was 3.11± 1.05 (p=0.0001). No significant complications were observed in both the groups.

Conclusion: FFP cost half than albumin and same duration required to reduce edema but with double number of infusion and it is safe in pediatric patients with NS presenting with moderate to severe edema.

Keywords: NS, Oedema, FFP,Albumin

Introduction

Nephrotic syndrome(NS) is a common childhood kidney disease characterized by massive proteinuria (> 1 gm/m^2/day), hypoalbuminemia(250mg/dl) .Edema is one of the cardinal clinical features of NS. It may vary from mild periorbital puffiness to generalized edema (anasarca).[1]

Treatment of the nephrotic edema remains controversial. In many cases of NS, the edema resolves spontaneously. Polyuria which results in edema resolution is induced by steroid treatment and usually begins after urine is protein free. However this can take several days. Medical supportive treatment is aimed at increasing urinary sodium and water excretion. It is indicated when NS is steroid-resistant or the edema is massive and leads to adverse effects such as oliguria, respiratory distress, pain from scrotal or labial swelling, and arterial hypertension[2]

Children with severe edema are usually hospitalized and treated with intravenous (IV) albumin and diuretics if euvolumic or hypotensive. In contrast to adults, children are often more severe hypoalbuminemic and edematous, necessitating hospitalization and IV albumin administration. Albumin is routinely used in children because of low serum oncotic pressure due to hypoalbuminemia, but there are reports of diuretic resistance and decreased efficacy in NS [2,3,4] increased diuresis when diuretics are given after IV albumin and reluctance to treat patients with diuretics only because of intravascular volume depletion, dehydration and increased risk of thromboembolic complications[5,6,]

Material and methods

1. STUDY DESIGN: Hospital based prospective study
2. STUDY PLACE: Department of Pediatrics , PBM Hospital, Bikaner
3. STUDY POPULATION: Patients with nephrotic syndrome.
4. SAMPLING TECHNIQUE: Random sampling
5. INCLUSION CRITERIA:Patients with age 1 to 18 yrs and diagnosis of nephrotic syndrome.
6. EXCLUSION CRITERIA: Children with secondary nephrotic syndrome were excluded from the study
7. DATA COLLECTION AND ANALYSIS:

Fluid overload was observed through history and physical examinations. All the patients were managed with fluid restriction (400 ml/m2 + previous day output), salt restriction (1-2 meq/kg/day) and bed rest and associated infection and asthma were screened and treated. Oral prednisolone was given at a dose of 60mg/m^2 /day. Beside these, 2 mg/kg/day oral furosemide or combination of furosemide & spironolactone was given for 3 days to achieve desired diuresis or more than 1% weight loss per day in anasarca or symptomatic fluid overload patient after assessing volume status. Anasarca was defined as huge edema with genital swelling. If therapeutic goal of relief from oedema had not been reached, then we considered these patients as ‘diuretic resistant‘ and divided into two

groups (Group-A, Group-B) in consecutive fashion. . The Group-A study population was with intravenous albumin, 1 gm/kg/day in single daily dose over 4 hours followed by intravenous furosemide 1 mg/kg/day. Salt poor 20% human albumin was administered which was osmotically equivalent to 200ml of plasma. The Group-B study population was with intravenous FFP 15ml/kg/day over 2 hours followed by intravenous furosemide 1 mg/kg. Proper screening and cross matching was done before FFP infusion. Efficacy of both groups of drugs was observed day to day by recording daily pulse, blood pressure measurement, weight chart, intake-output chart, dependent edema and scrotal swelling upto achievement of dry weight. Dry weight was defined as euvolumic state with normal blood pressure and without edema. The patient's urine was collected over 24 hours from 8 a.m. to 8 a.m. of the next day. Any complications of these agents were also recorded

All data collected will be entered into Microsoft Excel and will be analysed with help of appropriate software and tests of significance considering level of significance as $p<0.05$

Results

Table 1: Socio-demographic profile

Variable	Group-A	Group-B	p-value
Age in yrs	6.35±2.39	7.24±2.98	>0.05
Male : Female	16:14	18:12	>0.05

Table 2: Biochemical parameter

Variable	Group-A	Group-B	p-value
S. albumin (gm/L)	12.34±2.31	11.84±3.25	>0.05
S. creatinine (mg/dl)	0.53±0.02	0.51±0.03	>0.05

Table 3: Comparison of infusion & days to required to achieve dry weight in both groups.

Variable	Group-A	Group-B	p-value
No of Albumin (mean)	1.42±0.61		0.01
No of FFP (mean)		3.11±1.05	0.01
Days required to achieve dry weight	6.62±3.15	6.65±3.18	>0.05

Discussion

There was limited study reporting the use of FFP in the treatment of moderate to severe edema in children presenting with idiopathic NS. The aim of using FFP in combination with diuretics was to reduce edema and achieve dry weight in children with NS. It has been observed in different studies that albumin in combination with diuretic can reduce edema in children with nephrotic syndrome[7,8] .Though, some studies differ in synergistic effect of albumin and furosemide . But it is now recommended in many guidelines and in text [9,10]

Another study by Haque SS et al.(2014) had shown the use of mannitol and furosemide in resistant edema without any significant difference with albumin and furesemide[11]

The use of FFP in combination with diuretic for the same purpose has not been studied much and there is scarcity of published data. So, this study was intended with a view to compare the cost effectiveness of FFP and albumin in reducing edema in childhood NS targeting to achieve dry weight. In this study the target population was age and sex matched and type of NS also was almost similar.

Conclusion

FFP cost half than albumin and same duration required to reduce edema but with double number of infusion and it is safe in pediatric patients with NS presenting with moderate to severe edema.

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