

EXTRACORPOREAL BILIRUBIN REMOVAL IN A PATIENT WITH BILE CAST NEPHROPATHY DUE TO EXTREME HYPERBILIRUBINEMIA – A CASE REPORT

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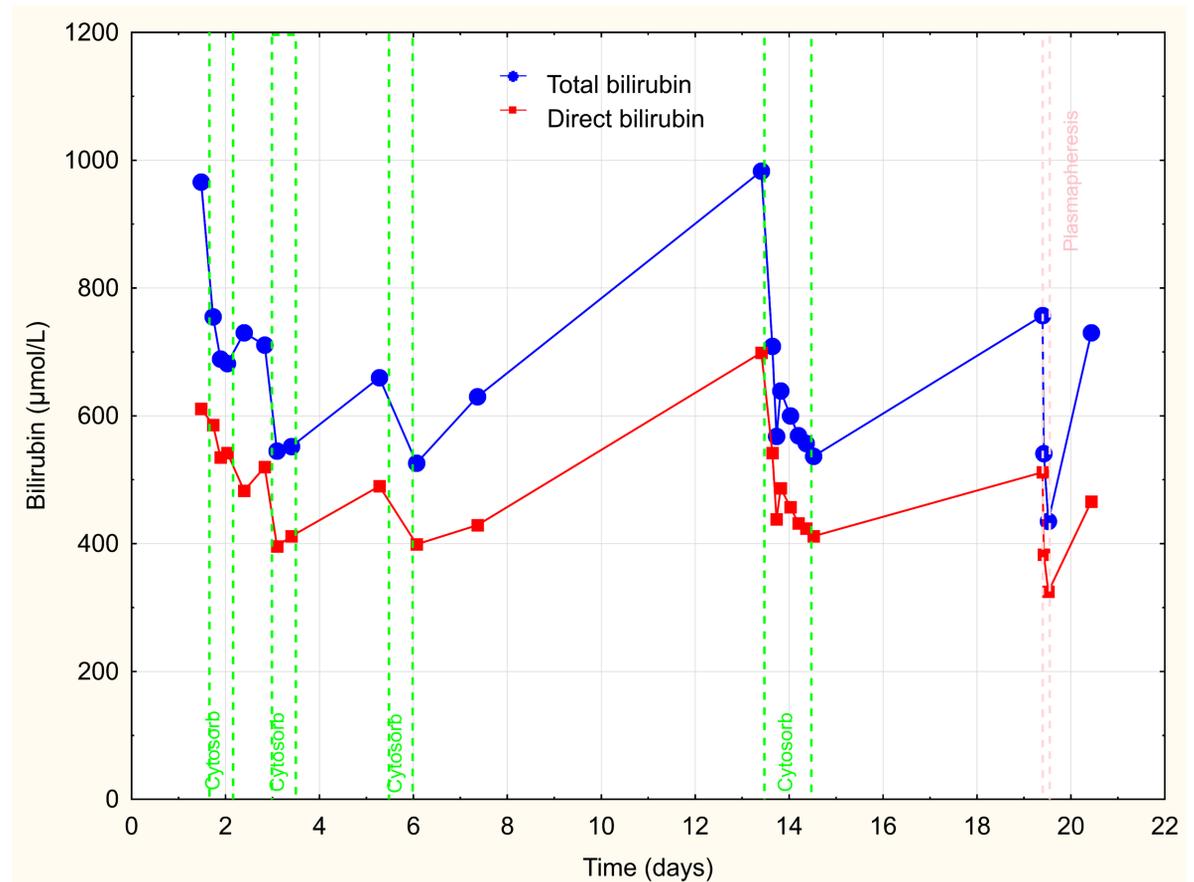
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INTRODUCTION

Although new studies suggest that mildly elevated bilirubin seem to have antioxidant and anti-inflammatory effects [1], high levels of bilirubin is considered to be toxic for the kidneys [2]. A combination of direct toxicity from bile acids and bilirubin, obstructive physiology from casts and systemic hypoperfusion can cause bile cast nephropathy which is one of multiple etiologies of acute kidney injury (AKI) accompanying liver failure. Membrane plasma exchange (PE) is used in patients with liver failure [3], but adsorption with new adsorbents (Cytosorb®) can be used for the sole purpose of bilirubin removal.

Graph



CASE

19-year-old patient with glucose-6-phosphate dehydrogenase deficiency and concomitant Gilbert syndrome with unconjugated hyperbilirubinemia (baseline total bilirubin levels around 100 µmol/L) was admitted because of extreme conjugated hyperbilirubinemia (maximal bilirubin 1203 µmol/L) without liver failure and with AKI (creatinine 156 µmol/L). Abdominal and endoscopic ultrasound excluded biliary obstruction and liver biopsy showed signs of cholestatic hepatitis suggestive for drug-induced liver injury. Kidney biopsy showed acute tubular damage, probably caused by bilirubin casts. Therefore four CVVH treatments with an adsorbent Cytosorb® were performed to lower bilirubin levels. Bilirubin dropped by an average of 28% during 12h of Cytosorb® treatment, and 15-19% drop in bilirubin across the adsorbent was still observed after 12 and up to 24 hours of treatment in a single prolonged procedure. During a single PE a 43% decrease in bilirubin was achieved in a 3 hour procedure. Overall, an effective reduction of bilirubin and improvement of kidney function was achieved. Later on, a magnetic resonance cholangiopancreatography showed signs of possible choledocholithiasis without bile duct dilatation and a few pigmented stones were removed on endoscopic retrograde cholangiopancreatography. No bilirubin adsorbing procedure was needed thereafter.

Table

Procedure	Total bilirubin before	Time from the beginning of procedure	Total bilirubin after	Difference in %
first CVVH + Cytosorb®	966	12h	682	29%
second CVVH + Cytosorb®	711	12h	552	22%
fourth CVVH + Cytosorb®	983	12h	600	39%
fourth CVVH + Cytosorb®	same procedure	24h	537	45%
Plasmapheresis	757	3h	435	43%

CONCLUSIONS

- Extracorporeal removal of bilirubin was effective in improving AKI due to bile cast nephropathy secondary to extreme hyperbilirubinemia of multiple etiologies.
- A prolonged (up to 24h) effectiveness of Cytosorb® adsorbent for bilirubin adsorption was shown, and removal rates compared favorably to those of plasma exchange.

REFERENCES:

1. Dekker, D., Dorresteijn, M. J., Welzen, M. E. B., Timman, S., Pickkers, P., Burger, D. M., Smits, P., Wagener, F. A. D. T. G., and Russel, F. G. M. (2018) Parenteral bilirubin in healthy volunteers: a reintroduction in translational research. *Br J Clin Pharmacol*, 84: 268–279. doi: 10.1111/bcp.13458.
2. El Chediak, A., Janom, K. & Koubar, S.H. Bile cast nephropathy: when the kidneys turn yellow. *Ren Replace Ther* 6, 15 (2020). <https://doi.org/10.1186/s41100-020-00265-0>
3. Tan EX, Wang MX, Pang J, Lee GH. Plasma exchange in patients with acute and acute-on-chronic liver failure: A systematic review. *World J Gastroenterol*. 2020;26(2):219-245. doi:10.3748/wjg.v26.i2.219