

The majority of the participants, 54% (n=262), were 20-29 years old, followed by 23% (n=114) that were 30-39 years old and 8% (n=40) were 40-49 years old. Only 5 individuals (1%) were above the age of 50 years, while 68 individuals (14%) were 20 years or younger. The mean age for the whole cohort was 28.6 years (males and females were 29.9 years and 23.6 years, respectively).

The mean serum levels of IgM, IgG, and IgA for the whole cohort are shown in Table 1. The immunoglobulin M, G, and A normal ranges are shown as the range between the 5th and 95th percentile. When we compared serum immunoglobulin levels in individuals below the age of 20 years (n=68), we observed a significant difference with regard to serum IgA levels, which occurred at lower levels in those young individuals compared to those above the age of 20 years (n=421), ($P<0.01$).

Comparing our results with those obtained from the neighboring Saudi population,² similar levels of IgM (1.14 g/L for Saudis versus 1.01 g/L for Omanis) and similar levels for IgA were noted. However, a significantly higher level ($P<0.05$) of IgG (14.63 g/L for the Saudis versus 12.88g/L for

Omanis) was detected. This may be due to environmental factors, since the climate in Saudi Arabia is quite different from the climate in Dhofar. Whereas the climate in Saudi Arabia is hot and dry all year, the climate in Dhofar is cold and rainy most of the year. Therefore, different antigen exposure in the two groups may account for the different levels of IgG. However, data from a cross-sectional study are needed to verify that the Dhofar population are different, per the reviewer comment.

Ali A. Al-Jabri
Shyam S Ganguly

Correspondence:
Dr. Ali A. Al-Jabri, PhD
Department of Microbiology
and Immunology,
College of Medicine & Health
Sciences, Sultan Qaboos
University,
P.O. Box 35, Al Khod,
Muscat 123
Sultanate of Oman.
Tel: +968-515186
Fax: +968-513419
aaljabri@squ.edu.om

References

1. Arthur G, Hamad A, Padma K and Abdullah S. Immunoglobulins, immunoglobulin G subclasses

and complement in adult Omanis. [Internet] <http://www.kfshrc.edu.sa/annals/171/96-190.htm>

2. Harfi HA, Godwin JT. Normal serum levels of IgG, IgA, IgM, IgD, and IgE in Saudi Arabia. King Faisal Specialist Hosp Med J. 1985; 5: 99-105.

N-Butyl-2-Cyanoacrylate (Histoacryl) Complication: A Case Report

To the Editor: The tissue adhesive N-butyl-2-cyanoacrylate (*Histoacryl*, Trihawk International, Montreal, Canada) is a well-known and effective modality for treatment of gastric varices secondary to portal hypertension of various causes. It has been used safely in many centers for up to 20 years.^{1,2} Nonetheless, in a minority of cases, its use has been associated with adverse effects like portal vein thrombosis. We report on the management of a secondary bleeding complication by placement of a transjugular intrahepatic portosystemic shunt (TIPS).

A 41-year-old woman was referred to our hospital with esophageal and gastric varices secondary to liver disease due to bilharziasis. She had multiple episodes of upper gastrointestinal bleeding. Esophagogastroduodenoscopy identified two esophageal and three gastric varices with evidence

Table 1. Serum IgM, IgG and IgA in healthy adult Omanis (ages 18 to 54 years) from Dhofar, Oman.

Variable	IgM			IgG			IgA		
	Both (n=489)	Males (n=389)	Females (n=100)	Both (n=489)	Males (n=389)	Females (n=100)	Both (n=489)	Males (n=389)	Females (n=100)
Mean	1.006	0.886*	1.471*	12.88	12.85	13.00	2.64	2.57*	2.90*
SD	0.511	0.450	0.468	2.76	2.97	1.71	1.12	1.07	1.27
95% CI	0.960, 1.051	0.841, 0.931	1.378, 1.564	12.63, 13.12	12.55, 13.14	12.66, 13.34	2.54, 2.74	2.47, 2.68	2.65, 3.15
5th Percentile	0.374	0.354	0.647	8.52	8.17	10.41	1.23	1.18	1.50
95th Percentile	2.050	1.640	2.469	17.45	18.30	15.60	4.77	4.72	6.51

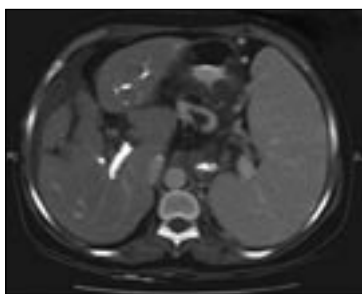
Serum immunoglobulin levels are in grams per liter

Asterisks (*) indicate significant difference in values between sexes.

Figure 1. Abdominal radiograph showing dense radiopaque material involving the portal venous circulation of both hepatic lobes.



Figure 2. Abdominal CT showing dense material in the right portal vein and a branch of the left portal vein. Splenomegaly and ascites are also present.



of hypertensive gastritis. A total volume of 2.5 cc of cyanoacrylate mixed with Lipiodol in a 1:1 ratio was injected at three different sites in the gastric varices. The patient started complaining of severe central abdominal pain, associated with generalized tenderness and rigidity 30 minutes after the procedure, but was hemodynamically stable. A plain abdominal radiograph obtained immediately showed no evidence of visceral perforation, but there was radiopaque material widely spread in the distribution of the portal vessels (Figure 1). A CT scan of the abdomen showed multiple areas of dense material in the vessels of the upper abdomen, including the portal vein and its intrahepatic branches, as well as the splenic, splenorenal collaterals, and renal and cardinal veins. Thrombosis of the portal and splenic veins was also seen (Figure 2). Ultrasound Doppler showed hyperechoic material in the portal vein with tur-

bulent blood flow in keeping with thrombosis. The superior mesenteric vein was patent.

The patient responded to analgesia, her symptoms disappeared completely after 7 days, and she was discharged home. The patient was readmitted 5 months later with another episode of upper gastrointestinal bleeding. A repeat CT scan and hepatic ultrasound images showed some resolution of the portal thrombosis. The patient underwent placement of a TIPS. After placement, the patient did well without further bleeding.

Histoacryl injection in the treatment of acute gastric variceal bleeding is safe and cost effective when used according to recommendations, which call for a small volume (<3 mL in total and <1 mL at each site) of *Histoacryl* and Lipiodol in a 1:1 ratio.³ Nevertheless, the endoscopist must be alert to potential immediate complications like abdominal pain, fever, impaction of the injected needle, distal embolization and acute thrombosis or late complications like venous thrombosis secondary to gastric cyanoacrylate injection.^{4,5} Initial hemostasis with this modality of treatment can be achieved in over 90% of patients,² obliteration of gastric varices can be achieved in 100%,⁷ but rebleeding can occur in about 10%.⁶

In comparison to a TIPS, *Histoacryl* injection therapy has no significant difference in terms of survival rate. It is relatively safe, has comparable rates of severe esophagogastric variceal bleeding⁸ and is more cost effective.⁹ To our knowledge, this is the first report of a TIPS placement to rescue a patient with major complications following administration of *Histoacryl* injection.

**Hamad Al Ashgar
Abdulrahman Kabbani
Yusuf Al Kadhi**

Correspondence:
Hamad Al Ashgar, MD
Consultant, Section of
Gastroenterology
Department of Medicine
MBC 46
King Faisal Specialist Hospital
and Research Centre
PO Box 3354, Riyadh 11211
Kingdom of Saudi Arabia.
Tel: +966-1-4424729
Fax: +966-1-4427499
alashgar@kfshrc.edu.sa

References

- Ogawa K, Ishikawa S, Naritaka et al. Clinical evaluation of endoscopic injection sclerotherapy using n-butyl-2 cyanoacrylate for gastric bleeding. *Journal of gastroenterology and hepatology* 1999; 14:245-250
- Akahoshi T, Hashizume M, Shimabukuro R et al. Long-term results of endoscopic Histoacryl injection sclerotherapy for gastric variceal bleeding: a 10 year experience. *Surgery* 2002; 131:S176-181
- Huang Y, Yeh H, Chen G et al. Endoscopic treatment of bleeding gastric varices by N-butyl-2-cyanoacrylate (Histoacryl) injection: long-term efficacy and safety. *Gastrointestinal Endoscopy* 2000; 52(2): 160-7
- Shim C, Cho Y, Kim J et al. A case of portal and splenic vein thrombosis after Histoacryl injection therapy in gastric varices. *Endoscopy* 1996; 28:461
- Hwang S, Kim H, Park S et al. N-Butyl-2-Cyanoacrylate pulmonary embolism after endoscopic injection sclerotherapy for gastric variceal bleeding. *Journal of computer assisted tomography* 2001; 25(1): 16-22
- Dhiman RK, Chawla Y, Taneja S et al. Endoscopic sclerotherapy of gastric variceal bleeding with N-butyl-2-cyanoacrylate. *J Clin Gastroenterol* 2002; 35:222-227
- Sarin SK, Jain AK, Jain M, Gupta R. A Randomized controlled trial of cyanoacrylate versus alcohol injection in patients with isolated fundic varices. *Am J Gastroenterol* 2002; 97: 1010-1015
- Noh du Y, Park SY, Joo SY, Park CH et al. Therapeutic effect of the endoscopic N-butyl-2-cyanoacrylate injection for acute esophagogastric variceal bleeding: comparison with transjugular intrahepatic portosystemic shunt. *Korean Journal of Gastroenterology/Taehan Sohwagi Hakhoe Chi.* 43(3):186-95,2004 Mar.
- Mahadeva S, Bellamy MC, Kessel D, et al. Cost-effective of N-butyl-2-cyanoacrylate (histoacryl) glue injections versus transjugular intrahepatic portosystemic shunt in the management of acute gastric variceal bleeding. *American Journal of Gastroenterology.* 98(12):2688-93,2003 Dec.