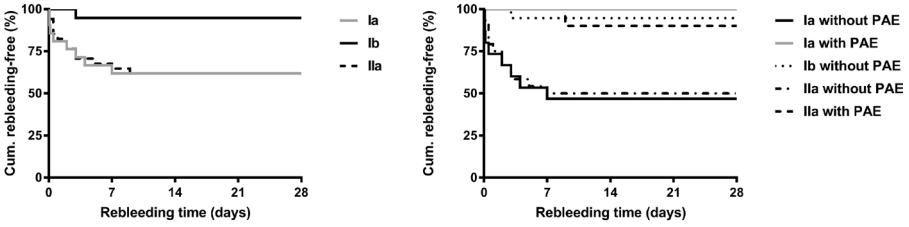
Prophylactic angiographic embolisation after endoscopic treatment of bleeding for high-risk peptic ulcers: what are the more appropriate indications?

We have read with great interest the paper by Lau *et al*,[1] which reported that prophylactic angiographic embolisation (PAE) did not reduce recurrent bleeding after endoscopic haemostasis in peptic ulcers.

This randomised controlled trial is well-designed and of high quality; however, there are some points to be discussed. First, patients with Forrest Ia, Ib and IIa ulcers were included in this study without stratification, by which the authors concluded that added embolisation did not contribute to the reduction of recurrent bleeding after endoscopic haemostasis. Rebleeding rates after the endoscopic intervention vary between different Forrest classifications (Forrest Ia: 58.8%, Ib: 26.0% and IIa: 21.2%).[2] Based on this classification, we would like to share some of our data here on a retrospective analysis (approved by Clinical Trial and Biomedical Ethics Committee of West China Hospital) of PAE after endoscopic control of bleeding to high-risk peptic ulcers. Patients with Forrest Ia, Ib and IIa ulcers, who were admitted to West China Hospital throughout the year of 2014–2016, were recruited and received endoscopic haemostasis (table 1). Some patients with Forrest Ia and IIa ulcers received PAE, whereas none of patients with Forrest Ib ulcer received PAE due to the doctors questioning that Forrest Ib ulcers have a high rebleeding risk.[3] The data showed that Forrest Ib ulcers had a lower rebleeding risk than Forrest Ia and IIa ulcers (figure 1A), and PAE was not necessary in Forrest Ib ulcers since the rebleeding-free curve pattern of Forrest Ib ulcers without PAE was similar with those of Forrest Ia and Ib ulcers with PAE (figure 1B). Our analysis indicated that



Number at risk								
Days	0	1	3	5	7	14	21	28
Ia	21	17	16	14	14	13	13	13
Ib	19	19	19	18	18	18	18	18
IIa	34	29	26	24	23	21	21	21

(A)

Number at risk								
Days	0	1	3	5	7	14	21	28
Ia without PAE	15	12	10	9	8	7	7	7
Ia with PAE	6	6	6	6	6	6	6	6
Ib without PAE	19	19	19	18	18	18	18	18
IIa without PAE	24	19	16	14	13	12	12	12
IIa with PAE	10	10	10	10	10	9	9	9

(B)

Figure 1 Rebleeding-free curves of different populations with peptic ulcer. (A) Rebleeding-free curves of Forrest Ia, Ib and IIa ulcers. P: Ia versus Ib 0.013; Ib versus IIa 0.011; Ia versus IIa 0.943. (B) Rebleeding-free curves of Forrest Ia ulcers with and without PAE, Ib ulcers, and IIa ulcers with and without PAE. All patients with Forrest Ib ulcers did not receive PAE. P: Ia with PAE versus Ia without PAE 0.037; IIa with PAE versus IIa without PAE 0.031; Ib without PAE versus Ia with PAE 0.574; Ib without PAE versus Ia without PAE 0.001; Ib without PAE versus IIa with PAE 0.659; Ib without PAE versus IIa without PAE 0.002. PAE, prophylactic angiographic embolisation.

Table 1 Baseline characteristics of different populations with peptic ulcer

	Different Forrest classifications with/without PAE						Rebleeding in Forrest Ia and IIa ulcers*		
	Ia with PAE (n=6)	Ia without PAE (n=15)	Ib without PAE (n=19)†	IIa with PAE (n=10)	IIa without PAE (n=24)	P value	Occurred (n=21)	Not occurred (n=34)	P value
Age (years)	60.8±13.4	60.7±17.7	58.7±21.8	51.8±16.5	55.1±17.4	0.720	64.1±10.9	52.1±18.3	0.004
Gender (male/female)	3/3	10/5	15/4	8/2	21/3	0.291	18/3	24/10	0.328
MAP (mm Hg)	80.8±20.0	83.2±17.5	82.0±16.5	72.7±13.2	77.3±12.9	0.444	79.9±12.8	77.6±16.6	0.578
Heart rate (beats/min)	88.3±14.7	90.5±17.7	90.5±23.3	98.4±20.5	98.6±23.9	0.593	98.2±20.6	93.4±21.0	0.405
Ulcer size (cm)	0.9±0.3	1.0±0.7	0.9±0.6	0.7±0.2	0.9±0.5	0.755	1.1±0.5	0.8±0.5	0.029
Haemoglobin (g/L)	66.7±9.0	59.4±15.4	64.6±28.3	58.1±12.8	61.8±20.4	0.825	57.1±13.0	63.4±18.4	0.174
Platelet ($\times 10^9$/L)	118.2±68.9	157.1±82.4	119.3±67.0	135.3±65.9	131.1±82.1	0.662	141.5±88.4	135.1±71.0	0.767
PT (s)	13.5±3.0	13.5±1.8	12.9±4.6	14.1±3.3	14.8±3.8	0.509	14.8±3.3	13.8±3.0	0.241
Rockall score	5.2±1.7	5.1±1.1	5.1±1.6	5.4±1.3	5.0±1.4	0.975	5.2±1.3	5.1±1.3	0.678

*As Forrest Ib ulcers had a significantly lower rebleeding occurrence comparing with Forrest Ia and IIa ulcers (figure 1A), only rebleeding and non-rebleeding individuals with Forrest Ia and IIa ulcers were compared on the baseline characteristics.
†All patients with Forrest Ib ulcers did not receive PAE.
MAP, mean arterial pressure; PAE, prophylactic angiographic embolisation; PT, prothrombin time.

PAE reduced the rebleeding occurrence in Forrest Ia and IIa ulcers (figure 1B). The negative result of PAE on rebleeding prevention described by Lau *et al*'s study might be related to their inclusion of Forrest Ib ulcers for analysis.

Second, haemoglobin <90 g/L on admission was indicated for PAE in their study.[1] A prospective cohort study did not find any significant differences of initial haemoglobin level between rebleeding and non-rebleeding peptic ulcers with Forrest classification higher than IIb.[4] Our data also agree with this observation (table 1). It seems lack of evidence that taking haemoglobin <90 g/L as a high-risk factor of recurrent bleeding or an indication of PAE in ulcer bleedings.

Finally, in regards to the ulcer size, Lau *et al* suggested that PAE reduced recurrent bleeding only in patients with the ulcer diameter ≥15 mm.[1] Our data also suggested that rebleeding ulcers had a larger ulcer size than non-rebleeding ulcers (table 1). The accurate assessment of the ulcer size may be critical for treatment decision and prognosis evaluation. Nevertheless, the question still remains as to how Lau *et al* determined the size of ulcers with an irregular shape.

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