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# How to Increase the Probability of Visualizing Angiographic Extravasation in Patients with Acute Hemorrhage from the Gastrointestinal Tract?

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We read with great interest the recent article by Kim et al. (1) reporting the incidence, predictive factors, and clinical outcomes of angiographically negative acute arterial upper and lower gastrointestinal bleeding. We have several comments and questions. First, transcatheter embolization is now accepted as the salvage treatment of choice for acute hemorrhage from the upper or lower gastrointestinal tract despite endoscopic treatment. Many published studies confirm the feasibility of this approach and the high technical and clinical success rates, which range from 69% to 100% and from 63% to 97%, respectively, in all case-series including more than 20 patients over the last decade (2–4). The main challenge in such situations is to detect and localize the bleeding source in order to enable safe catheter-directed therapy. We agree with the authors that most patients with persistent lower gastrointestinal bleeding, despite endoscopic therapy, may fail to benefit from a transcatheter embolization. This is because the angiography may fail to visualize the bleeding point. Indeed, only 68 (48%) of the 143 patients studied by Kim et al. (1) had signs of active bleeding at angiography (i.e., extravasation of contrast medium). However, in our experience, the extravasation rate can be much higher (3, 4). Three factors may contribute to explain this discrepancy: first, selective catheterization of the inferior hemorrhoidal artery must be performed routinely to increase the probability of visualizing active bleeding when the superior and inferior mesenteric arteriograms are negative, because this branch of the internal iliac artery sometimes supplies the distal colon and rectum. Second, intra-arterial anticoagulants, vasodilators, or fibrinolytic agents may be used during the angiography to directly elicit contrast medium extravasation, thereby facilitating the angiographic identification and localization of the bleeding lesion. It seems unlikely that the selective catheterization of the inferior hemorrhoidal artery and pharmacoarteriography were performed routinely by Kim et al. (1). Third, the likelihood of identifying the bleeding source is higher when the arteriogram is performed promptly after bleeding, that is, in hemodynamically unstable patients. Unfortunately, neither the mean time from bleeding onset to angiography, nor the hemodynamic parameters prior to referral for angiography is specified in the article by Kim et al. (1). Indeed, a high proportion (93 of 143; 65%) of patients were hemodynamically stable in this study. These data may probably explain the high rate (75 of 143; 52%) of negative angiography results and the high proportion (60 of 75; 80%) of patients who experienced spontaneous resolution of bleeding. As reported by the authors, we agree that angiographically negative results are relatively common in patients with a stable hemodynamic status. On the other hand, we think there are several errors in the results section of the article. The first mistake is in Figure 3, which states with the number of patients with a negative bleeding focus: is it really "n = 68" instead of "n = 75"? The second is in the last paragraph of the results section of the text: is it really "16 patients" instead of "12 patients"? The conclusions of this study suggest that a close working relationship between interventional radiologists, gastroenterologists, and diagnostic radiologists is necessary for the optimal management of patients with upper and lower gastrointestinal bleeding.

## References

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## *Response:*

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We wish to thank Dr. Loffroy for his great interest and valuable comments. In his letter, Dr. Loffroy pointed out the differences in visualization of active bleeding focus between our study (1) and other studies (2, 3) and pinpointed three factors that might contribute to these differences. Firstly, Dr. Loffroy mentioned that selective catheterization of the inferior hemorrhoidal artery should be performed routinely to increase the probability of visualizing active bleeding when the superior and inferior mesenteric arteriograms are negative. Although we did not describe in detail the selective catheterization of specific arteries in our study, we performed a selective catheterization of the inferior hemorrhoidal artery in cases of suspected bleeding areas upon endoscopy in the rectum and sigmoid colon. If so, you can use the words 'did perform' instead of 'performed' so that it is clear that you had done this in the initial study and that this was not a test conducted after the editor's comments. However, we believe that routine selection of the inferior hemorrhoidal artery is unnecessary because the majority of lower gastrointestinal bleeding usually occurs from the branches of superior or inferior mesenteric arteries (4).

Secondly, Dr. Loffroy suggested that a provocation test using intraarterial anticoagulants, vasodilators, or fibrinolytic agents might be helpful in detecting the bleeding focus. Although we are in agreement with Dr. Loffroy's suggestion, we do not think that the provocation test may be safe because of the possibility of worsened bleeding. In addition, there is a possibility of technical failure even active bleeding focus is detected after use of provocation test. Can you try to rephrase the sentence? I did not understand what the author meant. We suggest that the provocation test be used with caution in patients with frequent negative results upon angiography despite recurrent bleeding because, as we showed in our study, bleeding was controlled with conservative management only in the majority of patients with negative angiography results.

Thirdly, Dr. Loffroy pointed out that the rate of identifying the bleeding source was higher when the arteriogram was performed promptly after bleeding. From the results of the present study, we are unable to provide the mean time from onset of bleeding to angiography due to the lack of the accurate time in substantial portion of our study patients. However, the majority of patients underwent angiography within one day from the onset of bleeding.

Finally, in contrast to Dr. Loffroy, we postulate that the discrepancies in baseline patient characteristics between our study (1) and other published studies (2, 3) may be due to the inclusion of more patients with unstable hemodynamic status in the other studies. Furthermore, only patients with upper gastrointestinal bleeding were included in the previously published reports, while patients (33% of the study patients) with lower gastrointestinal bleeding (significantly associated with negative angiography results) were included in our study.

We appreciate Dr. Loffroy comments on the localization of bleeding point, where two significant mistakes in our report were pointed out. Firstly, the number of patients with a negative bleeding focus in Figure 3 should be 75 instead of 68. Secondly, the number of patients with rebleeding should be 12 instead of 16, as mentioned in the last paragraph of the results section as well as in the abstract. We regret both mistakes and have appropriately edited the manuscript.

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