

**Comprehensive prenatal ultrasound for surgical risk
assessment: Differentiating placenta accreta spectrum from
uterine dehiscence for improved clinical decision**

Journal:	<i>Ultrasound in Obstetrics and Gynecology</i>
Manuscript ID	UOG-2024-0722.R2
Wiley - Manuscript type:	Letter to the Editor (Direct Via EEO)
Date Submitted by the Author:	17-Oct-2024
Complete List of Authors:	Aryananda, Rozi; Rumah Sakit Dokter Soetomo, Obstetric & Gynecology; Universitas Airlangga Fakultas Kedokteran, Obstetric & Gynecology Adu - Bredu, Theophilus; University of Oxford Medical Sciences Division, Nuffield Department of Women's and Reproductive Health;
Manuscript Categories:	Obstetrics
Keywords:	Placenta Accreta Spectrum, Uterine dehiscence, Clinical diagnosis, Uterine sparing surgery, 3D rendering ultrasound
Note: The following files were submitted by the author for peer review, but cannot be converted to PDF. You must view these files (e.g. movies) online.	
Uterine varicess video S1.mp4 Videoclip_S1_Complete placenta separation with gentle traction and manual removal..mp4	

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Comprehensive prenatal ultrasound for surgical risk assessment: Differentiating placenta accreta spectrum from uterine dehiscence for improved clinical decision.

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For Peer Review

The presence of anterior **low-lying** placenta in patients with a previous Cesarean delivery (CD) increases the risk of placenta accreta spectrum (PAS), which is associated with massive obstetric hemorrhage and subsequent severe morbidity or mortality. However, there have been controversies in PAS diagnostic criteria, both clinically and histologically¹, with several published studies lacking clear diagnostic criteria².

The need for clarity prompted the International Federation of Gynecology and Obstetrics (FIGO) to establish definitive diagnostic **criteria** and classification system for PAS³ which **relies** heavily on the appearance of **the lower segment** at laparotomy. A potential issue arising from this definition is the overdiagnosis of PAS in cases of uterine dehiscence both **on** prenatal **ultrasoundly** and intraoperatively due to the presence of **lower segment remodeling**. Consequently, misdiagnosis of uterine dehiscence as PAS may lead to unnecessary treatment and **misinterpretation of the management strategies for genuine PAS cases** by the surgical team. This could potentially lead to even more severe consequences when a true case of PAS is encountered in the operating room. Furthermore, misdiagnosis of true PAS cases as uterine dehiscence leads to inadequate preparation for severe PAS cases in the operating theatre. Even though some PAS cases and uterine dehiscence can be managed with a similar technique (one-step conservative surgery), the importance of a preoperative surgical risk assessment cannot be overemphasized. Adequate preparation for blood, blood products and resource-intensive hemostatic procedures are crucial as the morbidity and risk associated with PAS and uterine dehiscence differ significantly. Regardless, the need for a multidisciplinary approach in managing both conditions is necessary to prevent unexpected adverse outcome.

Herein, we present the case of a 36-year-old, para 1 gravida 5, with one previous CD that was **referred to the PAS specialist clinic at Dr Soetomo General Academic Hospital, Surabaya, Indonesia** due to suspicion for PAS. Grayscale ultrasound showed uterine architectural distortion, such as myometrial thinning, loss of the clear zone and a placental bulge. The placenta was generally homogenous with a few lacunae, dilated vessels at the vesicouterine interface and a normal cervix (Figure 1a). Further investigation of the uteroplacental and vesicouterine interfaces using three-dimensional (3D) volume rendering and contrast enhancement techniques (VRU) (Crystal–Realistic Vue, Samsung Hera W10; Samsung, Seoul, South Korea) revealed the presence of the retroplacental clear zone throughout the entire

Commented [LS1]: AU: can this be amended to low-lying?

Commented [TAB2R1]: Resolved

Commented [LS3]: AU: Criteria added here. OK?

Commented [TAB4R3]: Yes. This is perfect

Commented [LS5]: AU: Has the criteria and classification system changed? If no, this will be amended to relies. OK?

Commented [TAB6R5]: The criteria has not changed. This has now been amended to relies

Commented [LS7]: AU: Is this directly referring to low-lying placenta/ placenta previa?

Commented [TAB8R7]: Yes. In addition, it directly refers to the appearance of the lower segment at laparotomy.

Commented [LS9]: AU: is this 'lower uterine segment remodeling after lower segment cesarean section'? as cases of lower segment remodelling seem to refer to after CD. How does this relate to prenatal dehiscence?

Commented [TAB10R9]: Yes. Lower segment remodelling refers to the thinning of the uterine tissue with an obvious bulge. This is seen on prenatal ultrasound as myometrial thinning and placenta bulge. Intraoperatively, it is seen as a thin transparent lower segment with a bulge. Hence, I have added ultrasound to the prenatal to make it much more clearer.

Commented [LS11]: AU: Apologies, please could you clarify what is meant by: misinterpretation of the management strategies for genuine PAS cases?

Commented [TAB12R11]: In genuine PAS cases, care must be taken particularly with ligating the massive serosal hypervascularity, ensuring that the PAS area is not manipulated due to the high risk of catastrophic hemorrhage. However, this risk is not present in cases of a simple uterine dehiscence. In simple terms, management for dehiscence is relatively easier than management for PAS. In this regard, when dehiscence is misinterpreted as PAS, the surgeons obtain experience in managing "so

Commented [LS13]: AU: Please provide details of the clinic they were referred to.

Commented [TAB14R13]: It was referred to the PAS specialist clinic at Dr Soetomo General Academic Hospital, Surabaya, Indonesia

placental bed (Figure 1b). A final prenatal diagnosis of simple uterine scar dehiscence and uterine varices with underlying placenta previa was made.

At laparotomy, a large, anterior wall lower segment dehiscence with uterine varices was observed on the serosa surface, presenting a similar appearance to PAS (Figure 2). Guided by the prenatal ultrasound imaging findings, we applied comprehensive intraoperative staging⁴. After suturing the colpouterus, the placenta was removed safely using gentle traction and manual removal (Videoclip S1). Uterine sparing surgery was successful, with total blood loss of 1500 mL.

This case demonstrates the utility of two-dimensional (2D) VRU and 3D-VRU ultrasound imaging techniques⁵ in ensuring a comprehensive preoperative surgical risk evaluation for patients, which enabled adequate preparation and appropriate surgical management. Since PAS and uterine dehiscence have a similar pathophysiological origin (i.e. uterine defect), they could occur independently or on the same placental bed. Furthermore, their intraoperative appearance can be very similar and sometimes indistinguishable, even among experts⁶. A clinical diagnosis of PAS should be established when there is evidence of uterine remodeling, serosa hypervascularity and failure of placental detachment. The presence and extent of vesicouterine adherence, serosal hypervascularity and vascularity of the cervix⁷ poses different degrees of surgical difficulty and morbidity risk even amongst PAS cases. Indeed, comprehensive intraoperative staging is relevant in finalizing the diagnosis, evaluating morbidity risk and management decision. However, as demonstrated in this case, intraoperative appearance may be deceptive and could lead to overestimation of the severity of the condition. Additionally, at laparotomy, surgeons are often blinded to the state of the cervix, as well as the uteroplacental interface, prior to proceeding with a bladder dissection. Grayscale and Doppler ultrasound are routinely relied on heavily in the prenatal assessment of these cases. However, the advent of new ultrasound systems with state-of-the-art advanced 3D-VRU properties enables a thorough evaluation beyond the current capabilities of 2D imaging⁵. These systems could be very valuable in enabling a comprehensive prenatal assessment of the surgical risk. In summary, due to the close intraoperative resemblance of high-grade PAS and simple uterine scar dehiscence, surgeons must not always jump to the conclusion of a PAS diagnosis.

Commented [LS15]: AU: 'uterine' added here. Is this correct?

Commented [TAB16R15]: Perfect

Commented [LS17]: AU: what is meant by 'underlying' in this context?

Commented [TAB18R17]: Beneath/under. The previa was under the area of uterine dehiscence.

Commented [LS19]: AU: VRU added here to make it clear you are referring to both 3D and 2D VRU. OK?

Commented [TAB20R19]: No. The VRU refers to the 3D only. So I have removed the VRU from the 2D.

Commented [LS21]: AU: Is this management of surgery or management post-surgery?

Commented [TAB22R21]: Surgical management.

Commented [LS23]: AU: to confirm: this is talking about during laparotomy, correct?

Commented [TAB24R23]: Yes please. This is talking about laparotomy.

Commented [LS25]: AU 'prenatal' added here. OK?

Commented [TAB26R25]: Perfect

Commented [LS27]: AU: 'scar' added here. OK?

Commented [TAB28R27]: Perfect

R. A. Aryananda^{1,2*} and T. K. Adu-Bredu³

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Figure legends

Figure 1 (a) Transabdominal grayscale and [power Doppler](#) ultrasound revealed loss of clear zone, myometrial thinning and placental bulge, with a vessel located at uterovesical interface. (b) Transabdominal three-dimensional ultrasound with volume rendering demonstrates presence of retroplacental clear zone across entire placental bed. Vesicouterine space was well demonstrated with intact urinary bladder serosa.

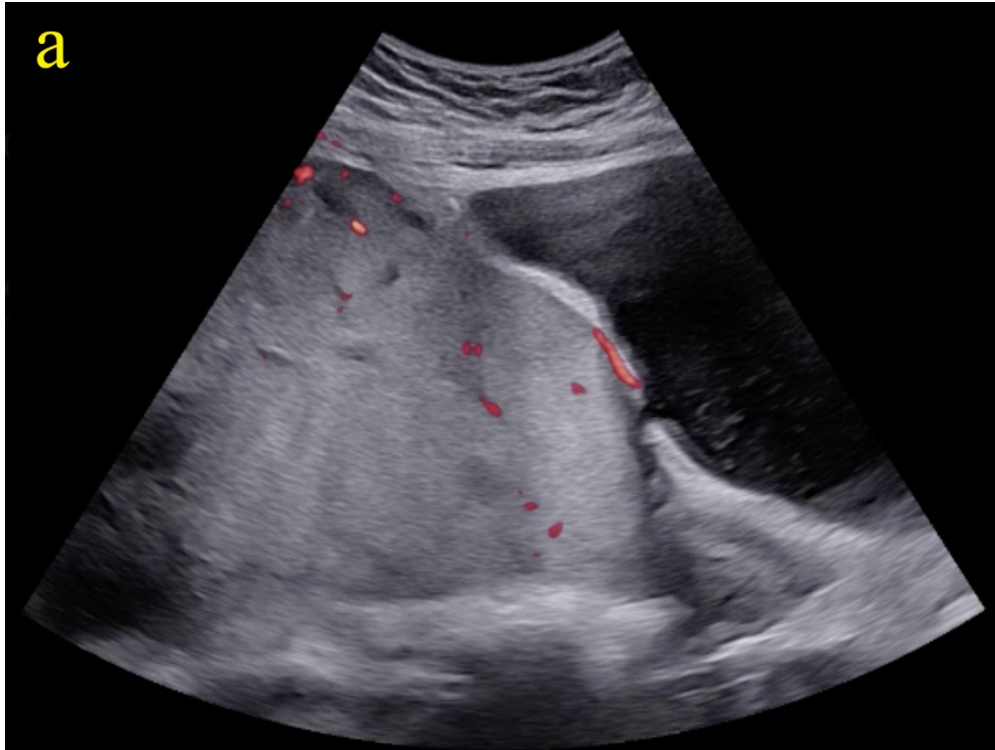
Figure 2: Intraoperative image of lower uterine segment showing large area of remodeling with uterine varices on serosa surface presenting an appearance similar to placenta accreta spectrum.

SUPPORTING INFORMATION ON THE INTERNET

Videoclip S1: Complete placenta separation with gentle traction and manual removal.

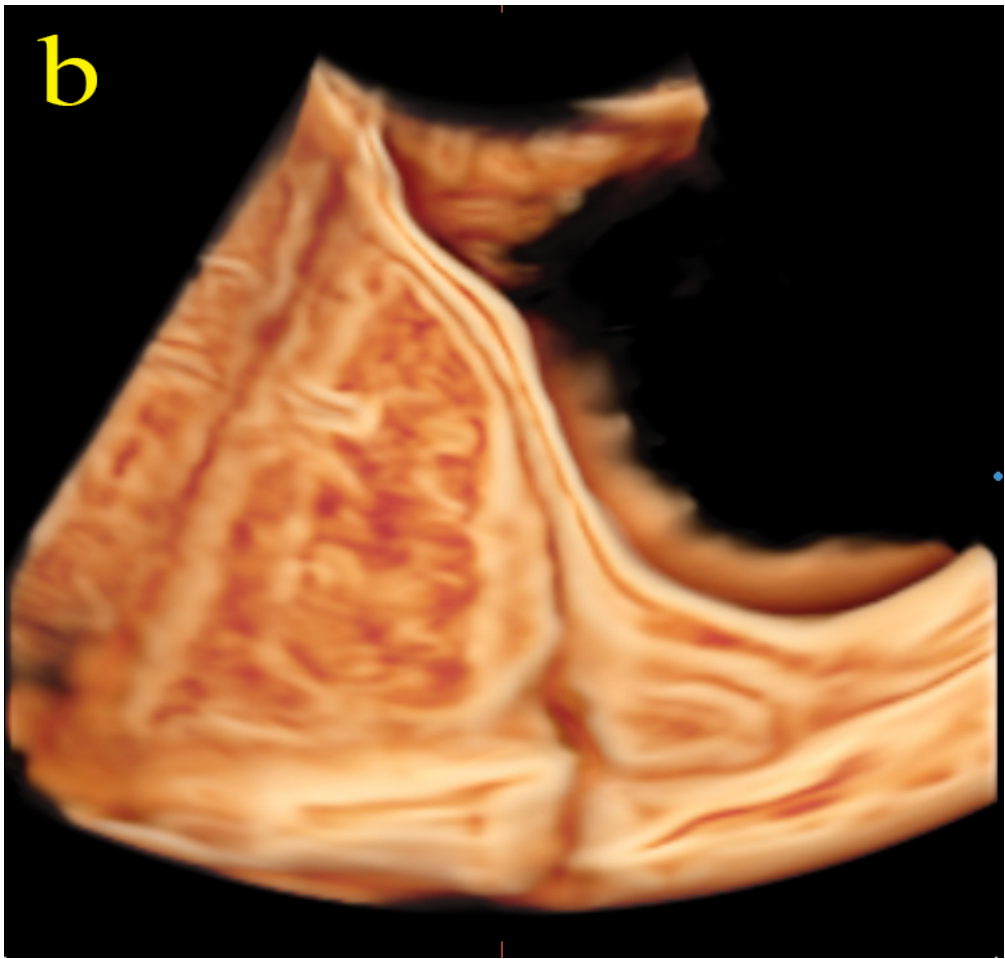
Commented [LS29]: AU: is this not a color Doppler?

Commented [RA30R29]: We are using power doppler



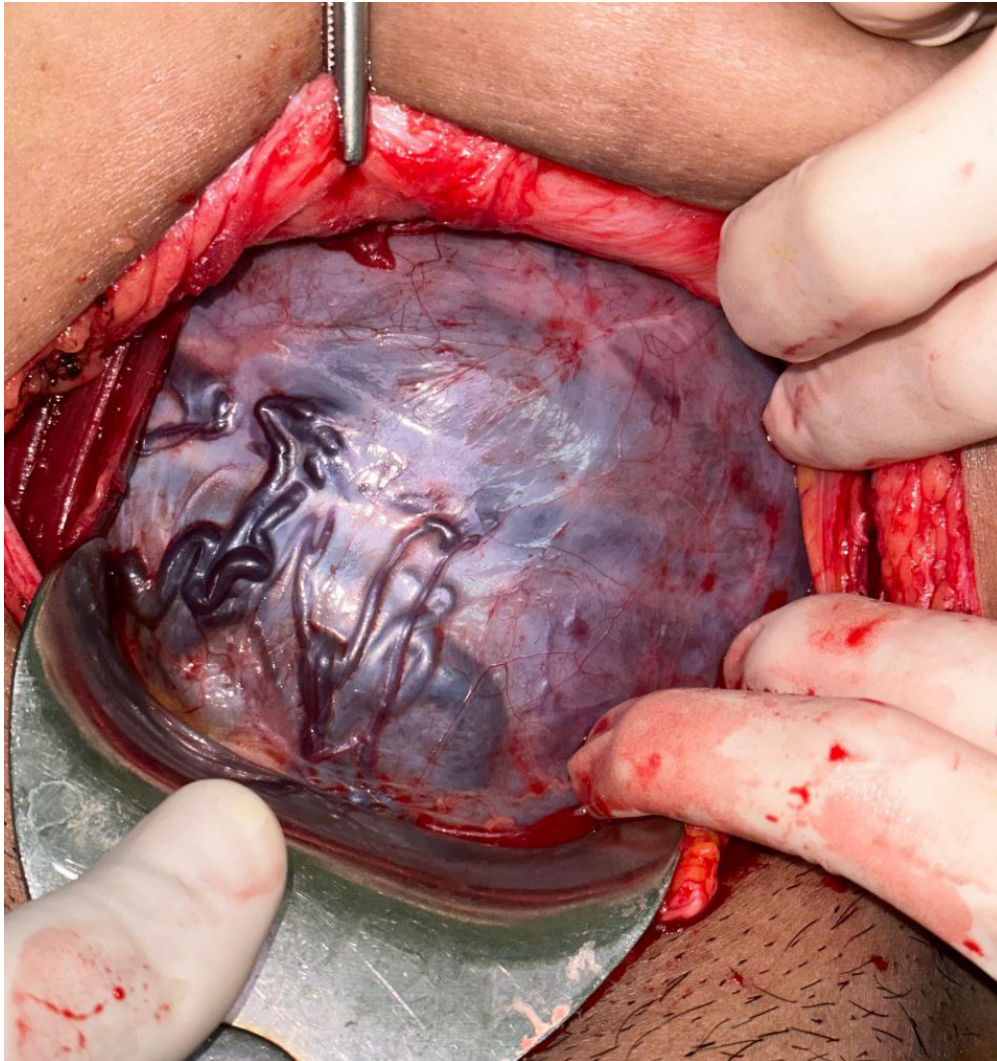
Transabdominal ultrasound grey scale and Doppler ultrasound revealed loss of clear zone, myometrial thinning, and placental bulge with a vessel seen at the uterovesical interface.

269x201mm (144 x 144 DPI)



Transabdominal 3D VRU demonstrates the presence of the retroplacental clear zone across the entire placental bed. Also, the vesicouterine space was well demonstrated with intact urinary bladder serosa.

273x259mm (72 x 72 DPI)



Intraoperative image of the lower uterine segment showing a large area of remodelling with uterine varices on the serosa surface giving an appearance similar to PAS.

337x357mm (72 x 72 DPI)

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Commented [LS1]: AU: The previous sentence 'This could potentially lead to even more severe consequences when a true case of PAS is encountered in the operating room' has been deleted and the information incorporated here. Is this OK?

Commented [LS2]: AU: Following your helpful response to a previous comment, 'due to differing risk of massive hemorrhage' has been added here for clarity. Is this correct? Please suggest any amendment.

placental bed (Figure 1b). A final prenatal diagnosis of simple uterine scar dehiscence and uterine varices with placenta previa underneath the area of uterine dehiscence was made.

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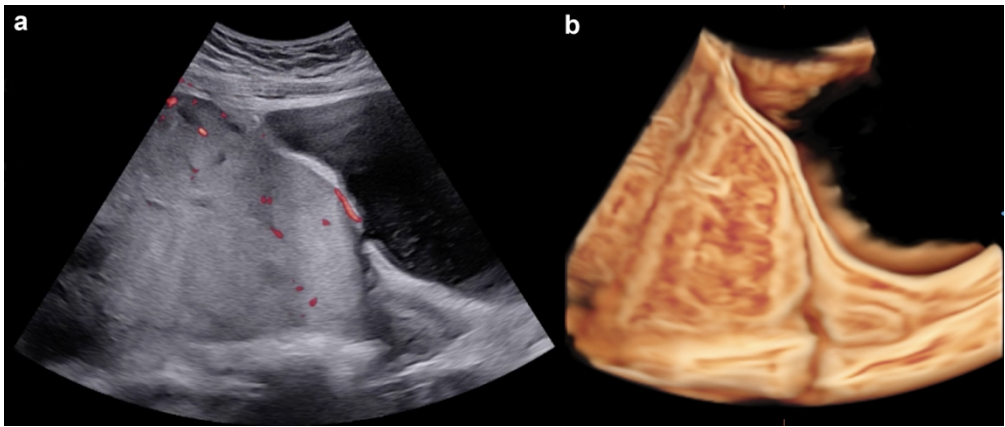
Figure 2 Intraoperative image of lower uterine segment showing large area of remodeling with uterine varices on serosa surface presenting an appearance similar to placenta accreta spectrum.

SUPPORTING INFORMATION ON THE INTERNET

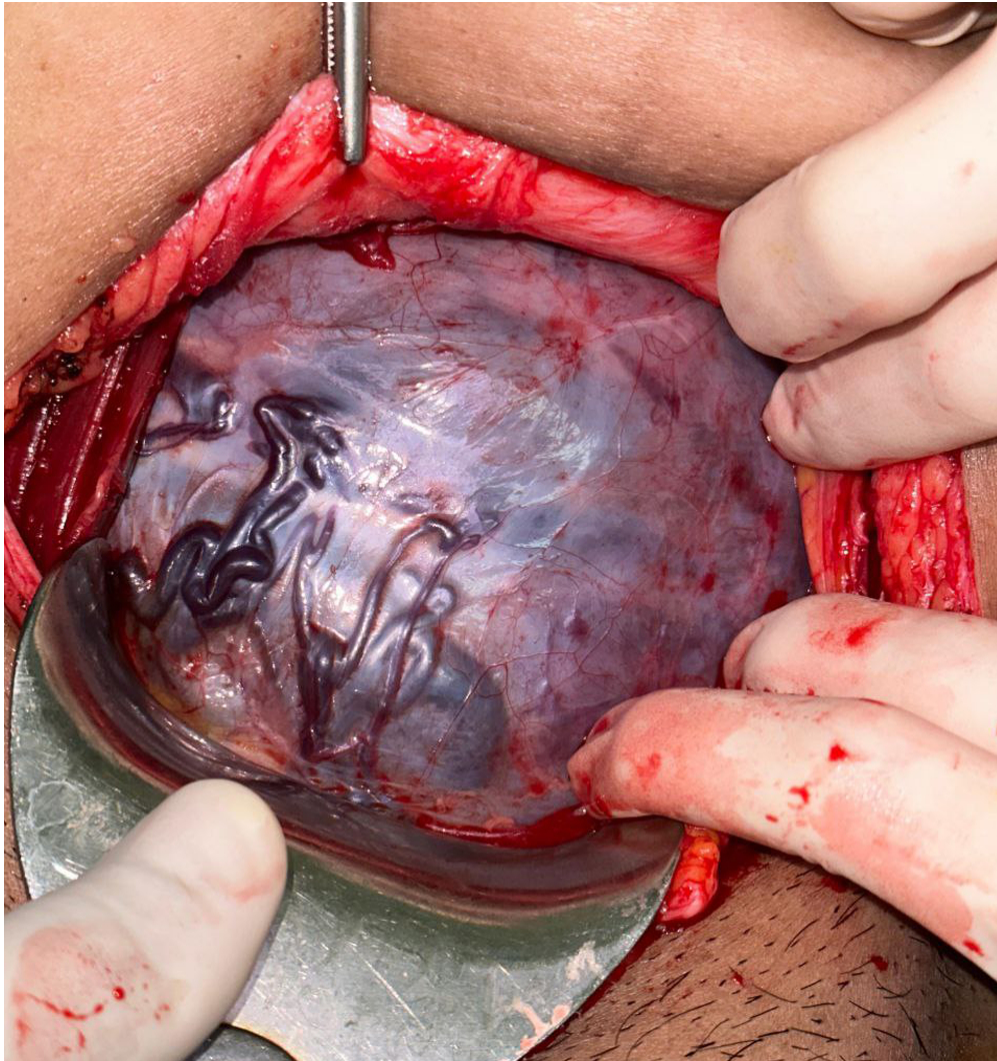
Videoclip S1 Complete placenta separation with gentle traction and manual removal.

Commented [LS3]: NOTE TO TYPESETTER:

Please set:
Figure 1 30 pica, color
Figure 2 single column, color.
Thank you



127x53mm (300 x 300 DPI)



84x89mm (300 x 300 DPI)