Utilising fruits to enhance first-trimester abortion simulation: can we do better than a papaya?

As access to reproductive healthcare decreases in the United States, there is increasing reliance on simulation to help trainees achieve proficiency in uterine aspiration. While this procedure has traditionally been simulated on a papaya,[1 2] we sought to identify if there was an alternative fruit that was similar or superior in key procedural components of first-trimester uterine aspiration.

We selected eight fruits based on size, shape and availability: papaya, passion fruit, dragon fruit, kiwano horned melon, roma tomato, bell pepper, butternut squash and grapefruit. Stations were set up with one of each fruit and instruments for uterine aspiration including tenaculum, Pratt cervical dilators and manual vacuum uterine aspirator. The study was deemed exempt by the Stanford University Institutional Review Board.

Ten clinicians experienced in uterine aspiration performed aspiration procedures on multiple fruits and completed paper surveys comparing the fruit to a uterus using Likert-style statements (0, strongly disagree to 4, strongly agree) regarding the characteristics of the procedure (size, cervical dilation, uterine aspiration, perforation, overall similarity). Based on prior studies, we classified a fruit as suitable for simulation if at least 70% of participants responded favourably (agree or strongly agree on Likert scale).[3] Finally, we asked participants to rate the fruit compared with the historical standard papaya. We present descriptive statistics here. To accommodate the small sample size, we obtained median differences in the fruit groups using nonparametric bivariate analysis of Kruskal–Wallis test by Monte Carlo simulation.

Multiple fruit met the a priori defined acceptable standard in each category: size (dragon fruit, kiwano horned melon, bell pepper), cervical dilation (papaya, dragon fruit), aspiration (passion fruit, dragon fruit, kiwano horned melon, roma tomato), grittiness (dragon fruit, kiwano horned melon) and perforation (roma tomato). Dragon fruit received the highest median rating for nearly all characteristics (overall similarity, size, aspiration) (table 1). There was less consensus among participants regarding dilation, grittiness and ability to perforate, with overall lower median scores comparing the fruits in similarity to a uterus. Compared with a papaya, all participants agreed (40%) or strongly agreed (60%) that the dragon fruit was a better approximation of completing a first-trimester uterine aspiration.

Table 1 Identification of the best fruit for each characteristic of uterine aspiration simulation

Characteristic	Best fruit	Median rating*	P-value†	Best alternatives
Overall similarity	Dragon fruit	3.5	<0.001	Kiwano horned melon or passion fruit
Size	Dragon fruit	3.5	<0.001	Kiwano horned melon or bell pepper
Dilation	Papaya	3.5	0.08	Dragon fruit
Aspiration	Dragon fruit	4	0.001	Kiwano horned melon or roma tomato
Grittiness	Kiwano horned melon or dragon fruit	3	0.38	
Perforation	Roma tomato or bell pepper or dragon fruit	3	0.81	

*Likert scale (0, strongly disagree to 4, strongly agree) comparing similarity of fruit to component of uterine aspiration procedure.
†P-value is calculated using approximative Kruskal–Wallis test.

This study suggests there may be alternative, in fact superior, fruit models for simulating uterine aspiration procedures. Among the alternatives tested, the dragon fruit was a highly suitable, even preferable, candidate for simulation. High-fidelity models for uterine aspiration are needed and this study demonstrates that dragon fruit can functionally simulate many of the key features of uterine aspiration. As none of our low-fidelity fruit models showed superiority in replicating dilation, grittiness or ability to perforate, this remains an area for future exploration as educators may choose to focus on specific components of the procedure. Generalisability of our study is limited by both sample size and geographical and seasonal availability in fruit selection. Future studies may consider a cost-effectiveness model to better quantify differences in price and model fidelity. When available, clinician educators may consider using a dragon fruit to simulate first-trimester uterine aspiration procedures.

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