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Assessment of the Self confidence of Obstetrics & Gynecology fellows to perform a postpartum hemostasis hysterectomy.

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ABSTRACT

Introduction: Hemostasis Hysterectomy (HH) is a last resort surgical procedure performed in situations of uncontrolled post-partum hemorrhage in maternity wards. The chances of being confronted with this situation are scarce during residency, and the situation is not well suited for teaching. Nevertheless, every obstetrician-gynecologist can be confronted with this stressful situation, and should therefore possess the surgical competence required, regardless of his routine practice. The aim of the present study is to evaluate clinical exposure and self-awareness concerning HH amongst obstetrics and gynecology residents and fellows.

Materiel and methods: We performed a survey amongst French obstetrics and gynecology fellows. An anonymous survey was sent by email between December 1, 2020 to July 1, 2021.

Results: Half of the interrogated fellows had practiced (as operator) an HH during residency with a senior and only 22,6% in post-residency. During the last year of residency 70% of them had performed less than 10 scheduled hysterectomies as primary operator. The laparoscopic approach was the most frequently practiced. Very few hysterectomies were performed as primary operator. Fellows with a surgical or mixed activity (both gynecological surgery and obstetrical activity in current practice) felt significantly more capable of performing HH compared to those with exclusive obstetrical or reproductive medicine activity; respectively 60% vs 36%, p = 0.008 ; Odds Ratio: 2.629 (95% CI 1.2214 ; 5.8094).

Conclusion :
The number of scheduled hysterectomies or HH performed as primary operator is very low during residency or fellowship. It remains largely inferior to the number deemed necessary in previous publications about the learning curve for scheduled hysterectomy, which varies from 18 to 80 interventions. Nowadays, the increasing number of residents, added to the decrease of hemostasis hysterectomies through better management of post-partum hemorrhage, pushes towards the development of specific training, such as “damage control simulation”.

Key Words : Hemostasis Hysterectomy ; learning curve ; residency ; training

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INTRODUCTION

Post-partum Hemorrhage (PPH) is defined by a blood loss ≥ 500 mL and is considered severe when the loss exceeds 1L, regardless of delivery method. In France, the incidence of PPH is around 5% of deliveries and around 10% when blood loss is quantified. The incidence of severe PPH is around 2%(1). Mortality from post-partum hemorrhage has been halved in fifteen years, in particular due to a decrease in deaths from uterine atony, and now represents 1 death/100,000 live births, making it the 5th leading cause of maternal perinatal death. This success is due to the improvement of practices and the implementation of guidelines. However, it remains responsible of nearly 90% of preventable deaths, mainly caused by delayed diagnosis and treatment(2).

Hemostasis Hysterectomy (HH) is a last resort surgical procedure, performed when medical treatments (use of uterotonics with or without intrauterine balloon tamponade), embolization and staged arterial ligations have failed. Emergency post-partum hysterectomy is known to be more difficult than a "scheduled" hysterectomy for a benign condition. When performed in the context of a post-partum hemorrhage, anatomical landmarks are different (due to the large size of the uterus), surgery is performed in a context of bleeding (often associated to bleeding disorders), and in a life-threatening situation, imposing an additional pressure on the medical team. The risks of being confronted with this situation are few for a resident and the situation is not well suited for teaching, but every obstetrician-gynecologist should be able to intervene when confronted with this life-threatening patient situation.

The aim of this study is to carry out an inventory of the training in French obstetrics and gynecology residents and fellows concerning the HH and scheduled hysterectomy techniques.

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MATERIEL AND METHODS:

Design:

We conducted a survey amongst obstetrics and gynecology fellows in France from December 1, 2020 to July 1, 2021. A questionnaire was create via Google Sheet in accordance with the General Data Protection Regulation and sent by e-mail to every fellow in France, regional coordinators relayed the questionnaire to fellows. The distribution of the questionnaire was carried out in the form of an internet link.

Data collection

The questionnaire consisted of 15 questions; the first one corresponded to the demographic characteristics of the participants (age, sex, year of post-residency and clinical orientation) ; the second part was the evaluation of the number of "scheduled" hysterectomies and hemostasis hysterectomies performed by the fellow during their last year of residency and during their fellowship according to the surgical approach (laparoscopy +/- robot-assisted, laparotomy, vaginal). Finally, the last part corresponded to their feeling of ease — or lack thereof — in performing a postpartum hemostasis hysterectomy, with its justification.

All the French obstetrics and gynecology fellows were invited to respond to the questionnaire.

Statistical analysis:

The data were recorded in a spreadsheet of the Excel 2018 software, version 16.16.20. For each question, the percentage of missing response was calculated ; for qualitative data, the percentages were calculated ; for quantitative data, the median as well as dispersion index were calculated. The statistical analysis was conducted using a two-sided Fischer's exact test for the qualitative variables. These analyses were performed on the BiostaTGV site: http://biostatgv.sentiweb.fr.

Missing data were not taken into account in the statistical analysis.

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RESULTATS

Demographic data:

One hundred and forty-seven fellows responded to the questionnaire. The median age of the participants was 31 years (min-max: 28-41 years). There were 22% (33/147) of men and 78% (114/147) of women. Concerning the practice location, 79% (116/147) of the participants worked in a university hospital ; 14% (21/147) worked in a non-university general hospital and 7% (10/147) worked in another type of establishment (comprehensive cancer center). Concerning the role of the participants: 59% (87/147) were fellows with a university role and 41% (40/147) were fellows without a university role, half of whom (20/40) had an activity shared between several sites. The characteristics of fellows who responded to the survey are presented in table 1.

Table 1 : Characteristics of fellows who responded to the survey

	Total n=147
Age (years)	31 (28-41)
Sexe	
Female	114 (78%)
Male	33 (22%)
Place of activity	
University Hospital	116 (79%)
Non university hospital	21 (14%)
Other	10 (7%)
Function:	
fellows with university function	87 (59%)
fellow without university function	40 (41%)
Semester of fellowship	
1	50 (34%)
2	21 (14%)
3	43 (30%)
4	16 (11%)
>4	16 (11%)
Principal Activity	
Gynecological surgery	51 (35%)
Obstetric	42 (29%)
Mixed activity (gynecologic and obstetric)	49 (33%)
Reproductive medical activity	5 (3%)

Postpartum HH activity:

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Concerning the practice of postpartum HH during residency, 49.7% had already performed HH with a senior ; the median number of hemostasis hysterectomies performed was 2 (min-max: 1-20). Half of the respondents had never performed this procedure. During their fellowship, 22.6% of the fellows had performed a HH with a senior (only 1 participant had performed a HH alone) ; the median number of performed postpartum HH was 1 (min-max: 1-7), 77.4% had never performed one.

Scheduled hysterectomy activity:

Regarding the number of hysterectomies performed as primary operator during the last year of residency : 70% of the fellows had performed less than 10 laparoscopic hysterectomies. The laparoscopic route was the most frequently reported. Very few hysterectomies were performed alone (complete performance of the hysterectomy without technical assistance from the senior supervising the procedure).

During the fellowship, the number of hysterectomies performed by fellows alone is small, few of them (30%) have performed more than 10 hysterectomies (70% performed less than 10 laparoscopically). The most frequently used surgical route was laparoscopic. Results are shown in Table 2.

We studied the number of hysterectomies performed by laparoscopic approach per fellow according to their clinical practice (fellows involved in a mainly surgical or mixed activity (n=100) versus fellows only involved in obstetrical or reproductive medicine activity (n=46)). During the last year of residency, there was no significant difference between these 2 groups in performing more or less than 10 hysterectomies ; $p = 0.44$. During the fellowship, fellows with a surgical or mixed activity had performed significantly more hysterectomies than those with a mainly obstetrical or reproductive medicine activity; the ratio of fellows that performed less than 10 hysterectomies was respectively 59% (59/100) and 96% (44/46), ($p << 0.05$; OR: 0.0332 95% CI 0.0008- 0.2119).

Concerning the surgical route when performing a hysterectomy, laparoscopy was the preferred surgical approach (59% chose this approach in the first), followed by laparotomy (51% chose this as a second intention), the vaginal approach (53% chose this as a third intention) and finally the robot-assisted laparoscopic approach (72% chose this as a last intention).

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Table 2 : number of hysterectomies performed during the last year of residency with or without a senior and during fellowship

Total = 147 (n)	Last year of residency (with senior)	Last year of residency (without senior)	During fellowship (without senior)
Laparoscopy			
<10	42,2% (62)	**70% (103)**	**70% (103)**
10-30	**44,9% (66)**	26,6% (39)	19,7% (29)
30-50	11,5% (17)	2% (3)	8,2% (12)
>50	1,4% (2)	0,7% (1)	
NC	0	0,7% (1)	1,4% (2) 0,7% (1)
Vaginal Approach			
<10	**76,2% (112)**	**89,8% (132)**	**86,4% (127)**
10-30	20,4% (30)	6,8% (10)	8,2% (12)
30-5	1,4% (2)	0	0
>50	0	0	0,7% (1)
NC	2% (3)	3,4% (5)	4,7% (7)
Laparotomy			
<10	**61,9% (91)**	**81,6% (120)**	**78,9% (116)**
10-30	35,4% (52)	17,7% (26)	15,7% (23)
30-50	2,7% (4)	0	2,7% (4)
>50	0	0	0
NC	0	0,7% (1)	2,7% (4)
Laparoscopy Robot-assisted			
<10	**83% (122)**	**89,1% (131)**	**84,4% (124)**
10-30	6,1% (9)	0	4,1% (6)
30-50	0,7% (1)	0	0
>50	0	0	0
NC	10,2% (15)	10,9% (16)	11,5% (17)

NC : no communicated

Confidence concerning postpartum HH:

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Concerning the feeling of capability to perform a post-partum HH at the end of the post-residency period, according to clinical orientation, the fellows with a surgical or mixed activity felt significantly more capable of performing HH compared to those with a mainly obstetrical or reproductive medicine activity; respectively 60% vs 36%, p = 0.008 ; OR: 2.629 95% CI 1.2214 ; 5.8094.

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DISCUSSION

The present study shows that only half of the responding residents had performed at least one postpartum HH during their last year of residency; with a median number of HH performed of 2. During the first year of fellowship, only 22.6% of the fellows had performed a postpartum HH, and the median number of performed HH was only 1. Clinical exposure to postpartum HH was very low during residency and post-residency. Furthermore, the number of scheduled hysterectomies performed during the last year of residency and post-residency was also low, with 70% of the fellows performing fewer than 10 hysterectomies during their last year of fellowship (however, a third of the population were starting their fellowship).

This is an opinion survey with weaknesses, like response and representativeness bias. There is no registry to know the number of fellows in France. Only 38 of 48 regional coordinators responded regarding the number of fellows in their department, so 136 fellows were counted, which is less than the number of respondents. The response rate cannot be calculated correctly. Hemostasis hysterectomy concerns every obstetrician-gynecologist, regardless of their daily practice. We can therefore imagine that the population that responded to the questionnaire is representative of the population of fellows, as shown by the distribution of respondents (35% in surgery/ 29% in obstetrics/ 33% with a mixed activity/ 3% in reproductive medical activity). All the fellows in France have been asked to respond to the questionnaire, representing a very large sample, and some will never be concerned by the realization of a HH. However the fellowship is still a training area and the future is not yet fixed, some could perform night shifts in level III maternity wards later

These disappointing results were unexpected because, as with any surgical act, there is a minimal learning curve that defines the number of procedures required in order to gain the necessary autonomy to perform said surgical act. For a hysterectomy, this number varies from 18 to 80, depending on the series(3-10). Wattiez et al. showed that the learning curve for standard laparoscopic hysterectomy was 30 cases(11). After 30 procedures, the rate of intraoperative complications decreased. In a retrospective series concerning laparoscopic

hysterectomy, Terzi et al. showed a significant decrease in operating time after 80 procedures(7). In a prospective series concerning laparoscopy-assisted vaginal hysterectomy, Kreiker et al. found the same results with a significant decrease in operating time starting from the 80th hysterectomy(8). According to Naveiro-Fuentes et al., the rate of postoperative complications decreased after approximately 75 laparoscopic hysterectomies performed(9). In more recent series, the decrease in operating time seems to have appeared earlier, and Mavrova et al. observed this decrease after 10 subtotal hysterectomies performed and 20 total hysterectomies performed by laparoscopy(12). Considering that the number of scheduled hysterectomies performed during residency is lower than the learning curve determined in these studies, scheduled hysterectomy cannot be seen as a surrogate for post-partum HH training. The number of hysterectomies performed by resident is low; other countries have the same difficulties, for example in Canada, a recent study showed that during their residency, 73% of GO residents performed less than 5 HT per laparoscopy and nearly 50% less than 20 vaginal hysterectomies(13). This low number can be explained by an increase in the number of residents and a decrease in the number of hysterectomies (proposal of alternatives to hysterectomy). This questionnaire was carried out during the period of the COVID epidemic when some hysterectomies for benign indications were delayed and this period also corresponds to the development of robotic assistance in France, a period during which senior surgeons were being trained in the technique, making access to the operating theatre even more restricted for the resident (as operator). The increasing number of residents in training and the reduction of the number of hours worked by residents (respect for safety breaks, development of non-surgical activities in the specialty) is leading to a decrease in the exposure of residents in the operating room.

Focusing on postpartum HH, the number of procedures performed by residents at the end of their residency and by fellows was very low. Furthermore, the probability of seeing or performing a postpartum HH will further decrease for several reasons: 1) the number of obstetrics and gynecology residents in France is increasing, rising from 140 in 2000 to 205 in 2020, 2) there is a decrease in the number of postpartum HH performed due to a better management of post-partum hemorrhage. In France, its management has been standardized thanks to national guidelines(1) and second-line approaches (intrauterine balloon tamponade, uterine artery embolization) have been developed in case of failure of medical treatments(14). In developed countries, in 30 years, the incidence of hemostasis hysterectomy has been divided by 10(15). The incidence is approximately 1 per 1,000 births(16).

Postpartum HH is an emergency surgery and is sometimes performed at night, so these situations are not suitable for teaching. For some surgical situations, residents can benefit from simulations on cadaver specimens, but this training model was inadequate for postpartum HH. This procedure has some technical particularities, compared to an hysterectomy on a non-pregnant uterus. Performing a hemostasis hysterectomy is technically more difficult than a standard hysterectomy because: there are important variations of the classic anatomical relationships between the posterior face of the bladder and the lower segment of the uterus; if the caesarean section is performed at full cervical dilation, the bladder then covers half of the lower segment. With the increased size of the womb, the uterine pedicles are ascended and lose their contact with the ureter. The ureters come to rest on the vaginal dome(17). Furthermore, because of the emergency situations in which postpartum HH are performed, the induced stress can lead to technical mistakes, with potential complications for the patient, such as ureteral injuries. University leaders and teachers will need to work on new ways, new methods for postpartum HH training, such as "damage control simulation", in order to guarantee proper safety in maternity wards in the years to come. Although HH is more difficult than scheduled hysterectomy, the different steps of a standard hysterectomy must be mastered in order to perform a HH, which is why we chose to quantify the number of hysterectomies performed during residency.

In order to facilitate the completion of the questionnaire, the authors chose to ask for the orientation of the fellow concerning their clinical activity rather than asking them for their clinical activity in figures. Indeed, asking them to quantify their different activities lengthens the response time and exposes to the risk of a decrease in the response rate. A quantitative approach to responses leads to a memory bias.

We showed no difference in the number of hysterectomies performed during the last year of residency according to sub specialization or activity of the fellows. However, the number of hysterectomies performed in the post-residency period was significantly different, which shows that specialization occurs after residency. The current tendency is towards a more and more specialized course, and in consequence towards less versatility. This will impact the team building in obstetrics and gynecology departments, considering that any given medical team requires at least one or two well-trained gynecologic surgeon(s) able to perform postpartum HH if necessary.

The present study showed that amongst French fellows, only 52% (77/147) felt able to perform a postpartum HH (with a probably lower percentage in routine practice due to a representativeness bias in our study). Indeed, Bouet et al. showed that in 176 obstetrics and gynecology residents, 78% felt that they were not capable of performing a postpartum HH(18).

CONCLUSION

The present study showed that only half of the residents had performed at least one postpartum HH during their last year of residency and only 22.6% during their first year as fellows. More surprisingly, 70% of the responding fellows performed less than 10 scheduled hysterectomies per year. Postpartum HH requires a strong set of surgical skills, considering the challenge imposed by a modified surgical anatomy, the life-threatening situation, and the stress naturally induced by such a stressful context ; but most of the future obstetrics and gynecology practitioners have these specific skills. These results confirm the need to refine residents' training with new tools such as simulation. Hemostasis hysterectomy is often performed in an emergency situation ; all obstetrics and gynecology practitioners working in maternity wards should be able to perform a HH. However, some HHs are performed in a more programmed manner (for example a cesarean section for placenta accreta) and the presence of a surgeon in the operating room can be interesting.

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