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RESEARCH ARTICLE

POSTOPERATIVE NAUSEA AND VOMITING: RETROSPECTIVE COMPARATIVE STATISTICAL STUDY

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Abstract

Postoperative nausea and vomiting (PONV) is a relatively frequent side effect during the first 24 hours following surgery and a major source of discomfort for patients. These are transient symptoms, which can worsen the functional prognosis, but also vital following the occurrence of serious complications. Our objective was to determine the real incidence of PONV in patients operated in our facility, to analyze the different risk factors found in the literature and to evaluate the relevance of our preventive and therapeutic strategies in this matter. We included 92 patients operated from September 23, 2021 to December 09, 2021 in a prospective observational study conducted in the different surgical departments (gynecology, visceral surgery, ear nose and throat department , traumatology) at the Mohamed V provincial hospital of Sefrou. The overall incidence of PONV was 47%. It was 23% at 6 hours and 24% at 24 hours. The incidence of nausea, vomiting, and nausea and vomiting was 17%, 11%, and 19%, respectively. Risk factors associated with the occurrence of PONV were : age (p=0.049), duration of surgery (p<0.01) and type of anesthesia (p=0.043). A preventive strategy with metoclopramide 10mg injectable at induction was followed in only 18% of cases, but was not effective on the occurrence of PONV. Indeed, it was noted that our practitioners had little interest or awareness of an appropriate preventive and curative protocol or strategy. We recommend the development of an antiemetic prophylaxis and the use of a preventive and therapeutic protocol for postoperative nausea and vomiting. For this, our work proposed at the end a practical brochure adapted to our context and which would be applicable in any national hospital structure.

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Introduction:-

Postoperative nausea and vomiting (PONV) is a side effect occurring in patients who have undergone any surgery. It is a fact relatively common which can have consequences on the one hand on the well-being of the patient thus causing the extension of their hospital stay, on the other hand on theworkload involving all nursing staff. It is thus estimated that a episode of vomiting prolongs patients' stay in the hospital room by 30 minutes post-interventional care (SSPI)[1].

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The incidence of PONV can vary from 20 to 80% depending on the nature of the symptom, its recurrence (isolated or continuous episode) and/or its intensity. PONVs would concern nearly one in three undergoes surgery. These events occur in more than half of cases after the sixth postoperative hour and may be ignored by the team anesthesia. The variation in the incidence of PONV is mainly explained by their multifactorial nature [2].

Their incidence depends on risk factors respectively linked to the patient, anesthesia, the intervention and the modalities of postoperative care [3].

Their frequency therefore varies from one population to another.

PONV may be accompanied by complications such as pneumonia.
inhalation, hydroelectrolyte disorders, esophageal lesions and ophthalmology, suture disunity, resumption of bleeding and delay
to mobilization[3],[4],[5]. Indeed, the complications are often functional,
rarely vital. We mainly talk about consequences in terms of quality of life and
health economics.

Our work is a cross-sectional observational study of interest to all
surgical services of the Mohamed V hospital in Sefrou. Our objective is to evaluate not only the incidence of this adverse event, but also the relevance and the application of preventive and curative strategies in the light of data recommended by learned societies.

On the other hand, through a summary statistical analysis, we sought the
risk factors related to this complication to compare them with those of

Literature. At the end, we crown our work with a structural brochure
instructive regarding the management of this event throughout the peri-period operative.

Materials And Methods:-

Description and purpose of the study:

We conducted a prospective observational study, bringing together 92 cases operated, over a period from September 23, 2021 to December 9, 2021.

Our study included all patients scheduled for surgery and patients requiring emergency intervention during the study period.

For each patient, the age, sex, risk factors, type of surgery and type of anesthesia. We also collected the different medications used for intraoperative anesthesia and postoperative analgesia, as well as both delays for resumption of transit and authorization of food by surgeons.

Our goal is to analyze the state of play in our training, by determining the incidence of PONV, and the main factors incriminated in their occurrence, in order to be able to draw up an adequate preventive and therapeutic strategy for each case.

Location of the study:

The Mohamed V provincial hospital in Sefrou has 4 surgical departments. In
In addition to the gynecology-obstetrics service, there are three other services, namely:

- ♣ Visceral surgery department
- ♣ Traumatology department
- ♣ Otolaryngology (ENT) department

The operating activity is organized around three rooms:

- ♣ A room dedicated to gynecology-obstetrics within the same department.
- ♣ Two others in the operating room; devoted to the planned activity and/or
emergency of the three other specialties (visceral, traumatology, ENT).

Study population:
1. Inclusion criteria:
All patients regardless of age, scheduled or admitted urgently for surgery whatever the type (digestive, traumatological, ENT, gynecological), and having benefited from general or regional anesthesia.
2. Exclusion criteria:
– Patients in whom local anesthesia was performed.
– Outpatient surgeries < 12 hours of hospitalization.

Data collection:
Information was collected from patients before the intervention surgical and 24 hours later, the operation register completed by the anesthetists and the monitoring sheet. Everything was brought together on an operating sheet. THE patients who were discharged within 24 hours were contacted by telephone whose number has been noted in advance on the form.

Use of data:
Data entry and analysis were carried out using Microsoft software.

Office Excel and Word 2013.

The analysis and interpretation of the results were carried out using the software online medical statistics: https://www.pvalue.io/fr. The degree of significance statistic was retained for $p < 0.05$.

Ethical considerations:
Great importance was given to ethical rules. We have interviewed the patients and collected the data on the operating sheet after obtaining the agreement of all department heads. Patients were informed objectives of the study and presented prior consent. Obtaining this allowed us to ensure respect for the participants throughout the study process.

Operating Sheet:
Postoperative period
Patient initials: **Date :**
Âge : Sex : F ☐ M ☐
1- patient risck factors :
o PONV history ☐
o Motion sickness ☐
o Anxiéty ☐
o Tobacco ☐
o Diabètese ☐
o Obésity ☐
2-Type pf surgery :
Emergency degree : Urgent ☐ non urgent ☐
Ent ☐ Digestive☐ Traumatology ☐ Gynécology ☐
Peropérative period:
1-Type of anesthésia : -Générale☐
-Locorégionale : spinalanesthésia ☐
Péridural ☐
Périphéral ☐
-Local ☐
2-Type of anesthésic : Propofol (DIPRIVAN°) ☐ Fentanyl ☐ Rocuronium(ESMERON°) ☐
Halogéns : Isoflurane ☐ Halothane ☐
postopérative Période:
1- postopérative Analgésia :
* Paracetamol ☐

* Néfopam ☐
* AINS ☐
* Morphine ☐
others :…
2- Duration of surgery: <60 minutes ☐ >60minutes ☐
3-PONV :
Nausées ☐ Vomissements ☐
Local : opérative room ☐
Recovery room ☐
Hospital room ☐
time of occurence : 0-6H ☐ 6-24H ☐
4- Antiemetic used within 24 hours
: Préventif ☐ and/or Curatif ☐
 none ☐
 Dexaméthasone ☐
 Dropéridol ☐
 Métoclopramide ☐
 Ondansétron ☐
 Aprépitant ☐
 Scopolamine ☐
5- Transit resumption time
: <12h ☐/>12h ☐ /> 24h☐ />48h☐/ >72h ☐
6- Time allowed to eat: >2h☐/>24h☐ />48h/ Autres …
7-Complications : hydroélectolytic Trouble ☐ Inhalation ☐
wound dehiscence ☐Extension of stay ☐discomfort☐

Results:-

Demographic and descriptive data:

Distribution of patients by age and sex:

Our study included 92 patients, 75% of whom were women, and 25% were men, with a M/F sex ratio of 1/3.

The average age was 41 years (± 17.6) with extremes ranging from 8 to 84 years. The predominant age group was 21 to 40 years old.

Distribution of patients according to risk factors:

Only 2% of the population studied did not present risk factors.

The remainder (98%) was distributed as follows:

98% of cases were non-smokers. The sikness motion represented 34% of all risk factors. Come next history of PONV at 13%, obesity, diabetes and anxiety respectively at 11%, 5% and 1%. non-smoking status is thus the risk factor predominant in the population.

Distribution of patients according to type of surgery:

77% of patients were scheduled for surgery. We have noted cases admitted to the operating room urgently, in 23% of cases.
The interventions performed were for example: treatment of inguinal hernia , cholecystectomy, appendectomy, cesarean section, hysterectomy, surgery fractures and thyroid surgery.
Gynecological surgery was predominant in our series. She represented 40% of all interventions combined, followed by digestive surgery at 39%, trauma surgery and ENT at 14% and 7% respectively.

Table 1:- Distribution of patients according to services.

Type of surgery	Surgery gynecological	Surgery visceral	Surgery traumatological	Surgery ENT	Total
Number of cases	37	36	13	6	92

4. Distribution of patients according to type of anesthesia:
Our patients benefited in the majority of cases from spinal anesthesia at a percentage of 73%, while general anesthesia was performed only in 27% of cases.

Clinical data:
1. Incidence of PONV according to time and place of occurrence:
We divided the population into 2 groups: group A which presented PONV (NVPO yes) and group B which did not present PONV (NVPO no).
43 out of 92 patients presented with PONV (47% of the entire population studied). The incidence of nausea, vomiting and nausea and vomiting was 17%, 11% and 19% respectively.

In group A, nausea was described in 37%, vomiting in 23%. and nausea and vomiting in 40%.

We then observed that the majority (40%) of group A (NVPO yes) presented both nausea and vomiting.

The observed incidence of PONV was 23% at 6 hours and 24% at 24 hours. In the group A, 49% and 51% of cases manifested PONV before or after 6 hours respectively following the surgical procedure. And this largely (81%) in the room hospitalization. While 19% had them in the operating room.

Incidence of PONV by age and sex:
31 out of 69 women and 12 out of 23 men presented with PONV.

Among patients who experienced PONV, 72% were women and 28% were men. Gender was not an entity linked to PONV (p=0.546).

The average age was statistically significantly different between the 2 groups. Age was then a risk factor linked to the occurrence of PONV.

Table 2:- Distribution of groups according to sex and average age.

	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
Female	31 (72%)	38(78%)	69	P=0.546 (NS)
Male	12(28%)	11(22%)	23	
Age (mean)	45 (±19.6)	37.6 (±15.0)	92	P=0.049(S)

NS: not significant S: significant
PONV was found in the age group [21; 40] to 35%. They were at 33% between 41 and 60 years old and 26% in patients over 60 years old. While age group [8; 20] seemed less affected (7%).

Patient-related risk factors:
The majority of cases (44%) in series A presented a single risk factor. 2 risk factors were found in 35% of cases.

Patients with 3 risk factors represented 14%, and 4 were found in only 7%.
We found non-smoking status, which was the predominant risk factor in the population, in 48% of group A, and 52% of group B.

Monitoring of travel sickness, found in 31 patients, including 58% of group A and 42% of group B.
12 patients had a history of PONV. Among these patients, 50% have
presented with PONV, and 50% were free of it.
Anxiety, obesity and diabetes were observed in respectively 1, 10 and 4 patients. They were found in group A at 100%, 70% and 100% respectively.
None of the cited risk factors reached statistical significance. By therefore, none were considered to be factors related to PONV.

Table 3:- Distribution of groups according to type of risk factor.

Risk factors	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
History of PONV	6 (50%)	6 (50%)	12	P=0.808 NS
Motion sickness	18 (58%)	13 (42%)	31	P=0.121 NS
Non-smoker	43 (48%)	47 (52%)	90	P=0.497 NS
Anxiety	1 (100%)	0 (0%)	1	P=0.467 NS
Obesity	7 (70%)	3 (30%)	10	P=0.180 NS
Diabetes	4 (100%)	0 (0%)	4	P=0.181 NS

NS: not significant

Risk factors related to surgery:
Our sample of patients in whom PONV was found (43 cases) isdominated by visceral surgery 42% followed by gynecological surgery 32% then trauma surgery 21% and ENT 5%.

The type of surgery was found not to be related to the occurrence of PONV. THE groups were distributed according to the type of surgery in the table below:

Table 4:- Distribution of groups according to type of surgery.

Type of surgery	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
Digestive	18 (42%)	18 (37%)	36	P=0.615 NS
Gynecological	14 (32%)	23 (47%)	37	P=0.160 NS
ENT	2 (5%)	4 (8%)	6	P=0.681 NS
Traumatological	9 (21%)	4 (8%)	13	P=0.079 NS

Total	43 (100%)	49(100%)	92	

NS: not significant.

Among patients scheduled for surgery, 51% had PONV and 49% did not have them.

21 patients needed emergency surgery. Only 33% of them have presented PONV. The degree of urgency was not an associated risk factor to PONV (p=0.161).

Table 5:- Distribution of groups according to degree of emergency.

Classification of surgery	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
Scheduled	36 (51%)	35 (49%)	71	P=0.161 NS
Emergency	7 (33%)	14 (67%)	21	
Total	43	49	92	

NS: not significant

Most surgical interventions in our series did not exceed 60 minutes. The surgery lasted more than 60 minutes in only 12 patients. Among of these patients, 10 presented with PONV, or 83%. While for a duration of surgery less than 60 minutes, 33 out of 80 patients experienced PONV, only 41%.

The duration of surgery was a factor associated with the occurrence of nausea and postoperative vomiting. Indeed, the risk increases when the duration of the intervention exceeds 60 minutes.

Table 6:- Distribution of groups according to the duration of the intervention.

Duration of the surgery	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
<60 minutes	33(41%)	47(59%)	80	P<0.01 S
>60 minutes	10 (83%)	2(17%)	12	
Total	43	49	92	

S: significant.

5. Risk factors related to anesthesia:

In general anesthesia, 4 anesthetic drugs have been used in all patients:

– The narcotic used: propofol (Diprivan°)

– The opioid used: fentanyl

– The curarizing agent used: rocuronium (Esmeron°)

– The halogen used: halothane

No administration of nitrous oxide or isoflurane was found.

25 patients received general anesthesia. It was observed that the majority of these patients (16) presented with PONV. That is to say 64%. While only 40% of those who received spinal anesthesia experienced PONV.

The type of anesthesia was therefore a risk factor linked to PONV (p=0.043).

Table 7:- Distribution of groups according to type of anesthesia Kind.

anesthesia	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value

General	16 (64%)	9 (36%)	25	P=0.043 S
Spinal anesthesia	27 (40%)	40 (60%)	67	
Total	43	49	92	

S: significant.

6. Postoperative analgesia:

In our sample, 4 analgesic medications were used: non-steroidal anti-inflammatories drugs (NSAIDs), 2 paracetamols (Perfalgan and Andol) and nefopam (Acupan°).

Morphine was not used postoperatively in any patient.

In group A: 2 analgesics were mainly used: NSAID at 48%
and perfalgan at 51%. While nefopam was found in group A in only 1% of cases.
In group B: NSAIDs and perfalgan were also the most common drugs most used with a percentage of 46% and 52% respectively. We administered Andol and nefopam in 1% of cases each.

The administration of analgesics was not statistically significantly different between the two groups. Postoperative analgesia using NSAIDs and/or perfalgan and/or nefopam and/or andol was then not considered to be linked to PONV.

Table 8:- Distribution of groups according to type of postoperative analgesia.

Painkillers	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
NSAIDs	40 (48%)	42 (46%)	82	P=0.327 NS
Perfalgan	42 (51%)	47 (52%)	89	P=1 NS
Andol	0 (0%)	1 (1%)	1	P=1 NS
Nefopam	1 (1%)	1 (1%)	2	P=1 NS

NS: not significant.

Prevention by metoclopramide:

Prevention with metoclopramide (Vomistop°) was carried out randomly, only in patients who have undergone gynecological surgery. It consisted to the injection of a 10 mg ampoule after induction of anesthesia.

Table 9:- Distribution of groups according to the use or not of metoclopramide.

Prevention	Group A (NVPO yes)	Group B (NVPO no)	Total	p-value
None	38 (51%)	37 (49%)	75	P=0.113 NS
Prevention/ metoclopramide	5 (29%)	12 (71%)	17	

NS: not significant

According to table 9, it was noted that only 17 cases received prevention
by metoclopramide before the operation, i.e. 18% of the population studied, while the The remainder (75 cases) did not receive one. It is important to mention that among patients having received prevention, only 29% had PONV. While in patients who did not benefit from any prevention, the percentages were almost similar: 51% of group A and 49% of group B.

Prevention with metoclopramide did not reach statistical significance
in reducing the incidence of PONV (p=0.113).
8. The Apfel and Povoc score:
The Apfel score was calculated for each patient based on certain factors
risk (female gender, non-smoking status, history of PONV or headache
transport, use of morphine postoperatively). Each of these parameters is
scored at 1. All our patients had a score ≥1 except 2.
The absence of a score 4 was linked to the fact that no patient received morphine postoperatively.
The presence of 0, 1, 2, 3 risk factors was associated with incidences of
NVPO respectively 0%, 38%, 44%, 59%.

Table 10:- Incidence of PONV according to the Apfel score.

Apfel Score	Group A (NVPO yes)	%
Score 0	0	0%
Score 1	6	38%
Score 2	17	44%
Score 3	20	59%

The Apfel score was used in all patients, except for one child aged 8 years old in whom the Povoc score was calculated. It was equal to 2.

Our next objective was to evaluate the preventive strategy of our practitioners in function of the Apfel score for adults, and the Povoc score for children. THE patients in our population whose score = 0 did not receive prevention. THE patients with a score ≥1 are distributed below:

Table 11:- Prevention with metoclopramide according to risk score.

Score from Apfel/Povoc	No prevention	Prevention/metoclopramide	Total
0	2 (100%)	0 (0%)	2
1	16 (100%)	0 (0%)	16
2	33 (83%)	7 (17%)	40
3	24 (71%)	10 (29%)	34
Total	75	17	92

We found that 16 cases had an Apfel score of 1 (low risk), but none
of them received a prevention. 40 cases had a score of 2 (moderate risk),
administration of metoclopramide was noted in 17%, while 83% did not

benefited. The remaining 34 cases, or 37% of the entire population, had a score to 3 (high risk). 29% of them received metoclopramide while 71% did not received.

Treatment of PONV:
Faced with the absence of a prophylactic and/or curative protocol for nausea and postoperative vomiting in our training, none of the patients in group A
(NVPO yes) was unfortunately not treated.

Resumption of transit and NVPO:
In our sample, 4 patients resumed transit before 12 p.m., 12 between 12 and
24 hours and most (63) between 24 and 48 hours. 11 patients resumed transit between 48 and 72 hours and only 2 took it again after 72 hours. The resumption of transit was distributed among the groups A and B as follows:

Table 12:- Distribution of groups according to transit resumption time.

Resumption time transit	Group A (NVPO yes)	Group B (NVPO no)	Total	Value of p
<12h	2 (50%)	2 (50%)	4	P=1 NS
12-24h	3 (25%)	9 (75%)	12	P=0.106 NS
24-48h	30 (48%)	33 (52%)	63	P=0.803 NS
48-72h	6 (55%)	5 (45%)	11	P=0.580 NS
>72h	2 (100%)	0 (0%)	2	P=0.216 NS

NS: not significant
The statistical analysis did not establish a link between the time for resumption of transit and the occurrence of PONV.

Resumption of food and PONV:
Only 3 patients resumed eating between 12 and 24 hours, they were all subject to PONVs. 84 patients resumed eating between 24 and 48 hours, 37 of them had PONV while 47 did not. 4 patients resumed eating after 48h. 3 of them had PONV. Only one patient ate between 6 and 12 hours and was not subject to PONV. This was an 8 year old boy operated on for cervicotomy explorer. Early or late resumption of eating was not linked to NVPO.

Table 13:- Distribution of groups according to time of resumption of food.

Allowed food Time	Group A (NVPO yes)	Group B (NVPO no)	Total	P-value
>6h	0	1	1	P=1 NS
>12h	3	0	3	P=0.098 NS
>24h	37	47	84	P=0.140 NS
>48h	3	1	4	P=0.336 NS

Consequences of PONV:
All patients in group A, without exception, described discomfort and major discomfort. Furthermore, these patients were all free of physical consequences secondary to PONV.

As for the financial consequences, we had to extend the stay hospital in 4% of patients in group A.

Summary of our Results:-

¬ In our series of 92 cases, 75% were women, and 25% were men, with a M/F sex ratio of 1/3.
¬ The average age was 41 years (± 17.6) with extremes ranging from 8 to 84 years old. The predominant age group was 21 to 40 years old.
¬ 98% of cases presented one or more risk factors. The factor of The predominant risk was non-smoking status.
¬ Gynecological surgery predominated with a percentage of 40%. Of even, the predominant type of anesthesia was spinal anesthesia (73%) versus 27% for general anesthesia.
¬ The overall incidence of postoperative nausea and vomiting (PONV) was 47%.
¬ The incidence of nausea, vomiting and nausea and vomiting was 17%, 11% and 19% respectively.
¬ The observed incidence of PONV was 23% at 6 hours and 24% at 24 hours.
¬ In group A (NVPO yes), 49% and 51% of cases manifested PONV before or after 6 hours respectively following the surgical procedure.
¬ Among patient factors, only age was linked to the occurrence of PONV ($p=0.049$).
¬ General anesthesia was a risk factor associated with PONV ($p=0.043$).
On the other hand, the statistical analysis demonstrated no link between PONV and the degree of urgency ($p>0.05$).
¬ Among the risk factors linked to surgery, the duration of intervention greater than 60 minutes was associated with the occurrence of PONV ($p<0.01$).
¬ Postoperative analgesia using NSAIDs and/or perfalgan and/or nefopam and/or andol was not considered related to PONV ($p>0.05$).
¬ Only 18% of the population studied received prevention with 10 mg of metoclopramide injection at induction. Prevention with metoclopramide did not reach statistical significance in reducing the incidence of PONV ($p=0.113$).
¬ All our patients had a score ≥1 except 2. The presence of none, 1, 2, or of 3 risk factors was associated with incidences of PONV respectively 0%, 38%, 44% and 59%.
¬ 37% of cases had an Apfel score of 3, which means a high risk of occurrence of PONV. Only 29% of them received metoclopramide preventive.
¬ None of the patients in group A (PONV yes) were unfortunately treated.
¬ The time for resuming transit and that for power authorization have not been did not describe a significant relationship with the occurrence of PONV ($p>0.05$).
¬ The consequences were mainly in terms of discomfort and prolongation of the hospital stay.
¬ Finding: Absence of prophylactic and/or curative protocol for nausea and postoperative vomiting in our training.

Discussion:-

Definitions and impact:
Nausea is defined as a subjective and unpleasant sensation accompanied by a need to vomit [6]. The clinical expression of nausea is broad ranging from a very moderate sensation – sometimes even vague and intermittent – to a violent sensation, sometimes sudden, followed by almost simultaneous vomiting. THE nausea may be accompanied by sympathetically mediated manifestations especially when they are intense and vomiting is closer. In particular, we can observe hypersialorrhea, increased heart rate, change respiratory rate, and the appearance of sweating, sometimes described as "sweating cold » [7]. Vomiting is

forced expulsion of gastric contents by the mouth, generated by the sustained contraction of the abdominal muscles, the descent of the diaphragm and the opening of the cardia. The "gagging" or efforts of vomiting are defined as spasmodic, rhythmic contractions of the diaphragmatic and abdominal muscles without expulsion of gastric contents and are assimilated in publications to vomiting[8], [9].

PONV represents all nausea and vomiting occurring in the first 24 hours following the surgical procedure. Previous studies have reported an estimated incidence of PONV of approximately 20 to 30% in the surgical population general and up to 80% in high-risk patients [8], [10], [11],[12], [13]. In In general, the incidence of vomiting is about 20% and that of nausea is about 40% [14].

In our present study, an incidence of PONV of 47% was reported.

The incidence of nausea, vomiting and nausea and vomiting was respectively 17%, 11% and 19%. No significant difference was noted in the time of occurrence. The incidence of PONV was 23% at 6 hours and 24% at 24 hours.

The Allene and Demsie study [15] was conducted over a period of 4 months in 2019.

A total of 398 patients who underwent surgery during this period were included in the study. The incidence of nausea, vomiting and nausea and vomiting postoperative rates were 20%, 4% and 22% respectively.

Moreno et al [16] conducted a prospective cohort study in a unit of post-anesthetic care for a period of 3 weeks. 157 patients subjected to elective non-cardiac and non-intracranial surgery were eligible for the study. The observed incidence of PONV was 23% at 6 hours, and 34% at 24 hours.

The variability in the reported incidence of PONV is probably due both to
the small size of the groups studied and the definition of the objectives of the studies [8].

In pediatrics, the overall incidence of postoperative vomiting (POV) is higher than in adults [17]. It represents up to 40% of patients [18]. 1% of patients whose operation is planned on an outpatient basis will have to be hospitalized because poorly controlled PONV [19]. In addition, it is important to note that in pediatrics, the notion nausea remains very subjective, the small child being incapable of evaluating it and describe. This is why it is legitimate to think that the overall incidence of PONV is probably underestimated in children.

Risk factors:
PONV has a multifactorial origin [20].
1. Patient-related:
In adults, independent risk factors for PONV have recently been confirmed and clarified in a systematic review. Risk factors linked to patient are female, history of PONV or motion sickness, fact not to smoke and age. Female gender is a constantly highlighted risk factor, multiplying the probability of PONV by approximately 3 [21], [22]. The influence of the cycle menstrual cycle was studied by Honkavaara et al [23]. He attributed this phenomenon to increased levels of estrogen, gonadotropin and progesterone plasma.

Confirmed by all multivariate analyses, history of PONV or motion sickness increases the risk of PONV by 2. Being a non-smoker significantly increases the incidence of PONV, but its influence seems less than the female gender. In the study by Chimbira and Sweeney [24], there were 85 smokers and 242
non smokers. Of the 327 patients, a total of 42 (13%) complained of nausea and postoperative vomiting. Among smokers, only 6% complained of nausea
and postoperative vomiting, compared to 15% for non-smokers.

The team of Roh et al [25] prospectively evaluated 200 patients consecutive patients who underwent outpatient hand surgery under general anesthesia
to assess their level of PONV during the 24 hours following the operation. The score Postoperative NV was higher in patients who did not smoke and had history of motion sickness.

The incidence of PONV is higher in young people, particularly those children. After adolescence, age is inversely associated with risk of PONV. He was demonstrated that a 10-year increase in age was associated with a decrease in 13% probability of PONV [26]. This risk factor is however not found
by other studies.

The regularly cited increase in body mass index is not a demonstrated risk factor. In a study conducted by Philips et al [27] on the incidence and risk factors associated with nausea and vomiting postoperative after orthognathic surgery, obesity was not a factor risk associated with the occurrence of PONV.

Anxiety cannot be considered as a relevant contributing factor in adults and gastroparesis, for example of diabetic origin, having a management particular anesthetic load, does not fall within the scope of this development [8].

The theoretical interest in knowing the predictive factors of PONV is to be able to target prevention towards patients who will most likely need it [19].

In our present study and among the patient-related factors, age was associated to PONV (p=0.049) but sex was not linked (p=0.546). We have not been in able to find differences between smokers and non-smokers in this regard, because only 2% of patients were smokers. History of PONV, pain
transportation, obesity, anxiety and diabetes did not reach statistical significance.

It should be noted that there is a total absence of any preventive policy in this regard in our structure. The reason put forward is the absence of a therapeutic arsenal recommended for this about.

Related to anesthesia:
The use of opioids as premedication increases the risk of PONV that H1 antihistamines could be beneficial. General anesthesia is associated with a higher incidence of PONV than regional anesthesia [8], [27] explained by the presence of volatile agents and opiates. The duration of anesthesia conditions the risk of occurrence of PONV. It is an important predictive factor of need for rescue medication.

A study in Germany found that the incidence of PONV was approximately nearly doubled for each additional 2 hours of exposure to anesthesia [28]. Halogenated vapors are all potentially emetogenic, it There is no argument favoring the use of a particular halogen. They represent the main risk factor for early postoperative vomiting and should therefore be avoided in patients at risk.

There is no argument favoring the use of a particular opioid. On the other hand, a strategy to reduce their intraoperative use would decrease the incidence of PONV. Postoperative use of these substances is a factor in demonstrated risk. Indeed, Apfel et al. found that opioid use postoperative conditions may be the strongest predictor of PONV [29]. Analysis retrospective of 253 adult patients carried out by Grabowska –Gawel et al [30] a found a significantly higher incidence of PONV in patients receiving
postoperative opioids compared to those receiving non steroidal – anti inflammatory drugs.

Non-use of nitrous oxide, in a high-risk population, helps prevent post-operative vomiting in 20 out of 100 patients. This However, this technique does not reduce the risk of nausea.

Propofol used only for induction has no demonstrated effect. When it is used to replace inhalation anesthesia, there is much less PONV during the first hours [8],[31]. The study by Klockgether-Radke et al [32] showed that patients who received propofol anesthesia presented with lower emetic scores than those who received halothane anesthesia.

Intraoperative gastric emptying or at the end of anesthesia would not decrease or even increases the risk of PONV. The results of a recent meta-analysis do not further justify its systematic use in abdominopelvic surgery. Moreover, mobilization and early oral rehydration of patients would promote the occurrence of PONV [8].

The results of our study are consistent with the results of Sinclair's study and
al [33]. A high incidence of PONV was noted in patients who received general anesthesia. The type of anesthesia was then a risk factor linked to PONV (p=0.043).

Our anesthetic team follows a standardized protocol during induction and
intraoperative maintenance. The anesthetic pharmacopoeia of our hospital is very restricted regarding the choice of hypnotic, analgesic and muscle relaxant products.

Thus propofol is the only intravenous hypnotic agent available, fentanyl is
also for opioids and rocuronium for curares. For maintenance inhalation, halothane unfortunately remains the leader. The titration is watchword for adjusting the doses to the terrain.

Furthermore, our study did not establish a link between the time to return to work diet and PONV.

Related to surgery:
Certain surgeries are associated with a higher risk of PONV such as ENT, digestive, gynecological, breast and ophthalmological surgery. It is however
difficult to assert responsibility for a type of surgery when it is carried out in
patients at risk of PONV. The duration of the surgical procedure (> 60 minutes), and therefore anesthesia increases the risk of PONV to a lesser extent than factors of patient-related risks [1], [19].

A questionnaire-based study conducted by Doubravaska et al [34] was performed on the first postoperative day to determine the incidence of nausea and postoperative vomiting (PONV), identify risk factors and assess the treatment and its effectiveness. Shorter surgical procedures have been
accompanied by a lower incidence of PONV than longer operations (more than 60 minutes).

Apfel et al [35] carried out a systematic analysis of prospective studies (n>500 patients) and applied multivariate logistic regression analyzes to identify independent predictors of PONV. Out of 13 surgical categories, only three reached statistical significance; cholecystectomy was the strongest predictor of PONV, followed by laparoscopic procedures and gynecological surgery.

Concerning the risk factors linked to surgery in our study, we note:
The duration of the intervention and, in turn, the duration of exposure to gas
Anesthetic is a very important risk factor for PONV.
Our results are comparable to those of Doubravaska et al with an incidence 83% higher PONV in patients operated on for more than 60 minutes compared to lower incidence (41%) when surgery lasted less than 60 minutes ($p<0.01$).

Our study did not report a link between the type of surgery and the occurrence postoperative nausea and vomiting.

Occurrence of PONV was not related to scheduling or procedure urgency of surgery ($p=0.161$).

We wanted to analyze the impact of resuming transit on the occurrence of nausea. and postoperative vomiting, although this factor is not present in the
literature. The results of our study demonstrated no link between the two.

In children, only one study is available to us which identifies 4 factors of independent risk of vomiting: the duration of the surgery exceeds 30 minutes, age greater than 3 years, history of postoperative vomiting in parents and/or siblings and strabismus surgery [22].

The most important risk factors are summarized in the following table:
Table 14:- The main risk factors for PONV according to the literature [37].

Related to the patient	Related to the intervention	Related to anesthetic management
Female gender	Type of surgery	Intravenous anesthesia
Age	Duration of the act	Nitrous oxide
ATCD of PONV, pain transport		Use of halogenated gases

Nicotine abstinence (non-smoker)		Postoperative Use of opioids

Prediction factors:
Systematic widespread treatment of all patients with the same regimen antiemetic is wasteful and exposes them to unnecessary risks of adverse effects, although this risk is relatively low. It is far better to estimate the risk for each patient [36].

Significant progress has been made in our knowledge of the factors of risk associated with PONV, and predictive scoring systems have been developed [38].

There are currently 5 PONV prediction scores:
Palazzo and Evans published the first predictive score for PONV in 1993 [37] in of orthopedic surgery patients [39], and which highlights the main risk factors: female gender, history of PONV, motion sickness and postoperative use of opioids. A validation of this score out of 400 patients suggested that this model could be transferred to other types of surgery.

The Sinclair et al score, constructed from a patient population of outpatient surgery, has the particularity of including risk factors linked to patient, surgery and anesthesia.

Then comes after the score of Junger et al, Koivuranta et al and the score of Apfel et al. Two of the proposed scores, that of Palazzo et al. and that of Sinclair et al, underestimate the incidence of PONV is approximately 30%. The score of Palazzo et al. reveals a lower discriminating power compared to others. Only the scores of Koivuranta and al. and Apfel et al. have discriminating power and satisfactory calibration [8].

As the differences between the two scores are negligible (see table 15), it was possible to simplify them and only four essential risk factors are retained: female gender, history of PONV or motion sickness in history, abstinence from nicotine (non-smoker), and use of opiates postoperative. Of the five published PONV prediction scores after anesthesia halogenated, constructed following the methodology previously described, only the score by Apfel et al is retained, for its external validation and its simplicity [22], [37].

The incidence of PONV increases from 10% to 21% then 39%, 61% and 78% depending on whether it There are none, 1, 2, 3 or 4 of these risk factors [40].

In our study, the presence of none, 1, 2 or 3 risk factors was associated at an incidence of PONV of 0%, 38%, 44%, 59% respectively. Nevertheless, it must be emphasized that this search for risk factors for PONV is not the rule among the anesthetic team given the absence of arsenal therapeutic to deal with it preventively.

The therapeutic attitude boils down to the injection of metoclopramide in the event of NVPO.

Table 15:- The difference between the Apfel score and the Koivuranta score [41].

Risk factors	Apfel score n=4	Koivuranta Score n=5
Female	Yes	Yes
History of motion sickness }	Yes	Yes
History of PONV	Yes	yes
Non-smoker	Yes	Yes

Post-op morphine.	Yes	No
Duration > 60 min	No	Yes

Postop: postoperative.

The Povoc score for children was developed because a number of risk factors (notably not smoking) are not relevant in children, and it is more likely that this is the patient's first anesthesia, this which makes personal history difficult to assess. The score gives one point for each of the following: duration of surgery more than 30 minutes, age greater than 3 years, strabismus surgery, and personal or family history of PONV [36],[17].

Table 16:- Table showing the Povoc score in children.

Risk Factors	Points
Age > 3 years	1
Surgery duration >30 minutes	1
Strabismus surgery	1
Personal or family history of PONV	1
Total	0…4

Conclusion:-

Postoperative nausea and vomiting (PONV) represents a challenge frequent intraoperative, fortunately with few consequences but not completely harmless.

This is a real challenge for any anesthesiologist. The score application validated and easy-to-use prediction, allows us to propose a preventive strategy graduated.

Only a thoughtful multimodal intervention will then make it possible to provide significant improvement in PONV, increase patients comfort and improve their recovery.
Our work made possible to highlight the state of play of this incident how trivialized and therefore poorly supported. Thus, the incidence of PONV was very high when comparing it to various studies in the literature.
The risk factors identified, despite the narrowness of our sample, were age, type of anesthesia and duration of surgery.
This observation should alert us all, because it can also be the case in different national anesthetic establishments. At the end, a tutorial, informative and promotional brochure for optimal management of our perioperative patients will be very interesting.

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