Emergency endoscopy for upper gastrointestinal bleeding in patients with coronary artery disease

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Introduction

- UGIB→ hypotension, tachycardia→ compromise CV function
- Endoscopy →diagnostic therapeutic tool in managing UGIB:
  - Identify the bleeding source
  - Hemostasis
  - Limit the need for surgical intervention
- Endoscopy→ CV complication: arrhythmia, Myocardial ischemic, MI. (0.005-0.5%) (catecholamine release→ oxygen demand)
- CAD: increase risk of UGIB: anti-platelet agent
- Dilemma with stable CAD with UGIB

Goals of this investigation

- Using a comprehensive evaluation of cardiac indices →to examine the cardiovascular responses:
  - Preclinical cardiac arrhythmias
  - Ischemia
  - Autonomic derangements
- At different stages of Emergency endoscopy in patients with stable CAD and UGIB.

Methods-- Population

- Prospective study: endoscopy department of a tertiary university hospital : April 2005- November 2006
- CAD v.s. non CAD group
- UGIB: melena, coffee-ground vomitus, hematemesis
- CAD: > 50% stenosis in one cronary artery
  positive treadmill exercise test
  History of MI
- Exclusion: acute MI, shock unresponsive to resuscitation, underlying advanced malignancy, pregnancy, diagnosed liver cirrhosis, active lung disease requiring ventilator support.
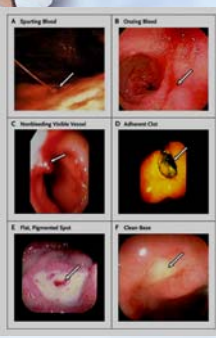

Methods—study protocol

- Before endoscopy→ stabilized via fluid resuscitation
- Emergency endoscopy →within 24hrs
- Lab: CBC, cardiac enzyme, ECG
- MI criteria:
  - angina, ECG changes, elevation cardiac enzymes → close monitor
- 3-channel ambulatory continuous ECG recorder: 30 mins before and 2 hours after endoscopy.

Methods-Endoscopy

- Premedication: limited to butyl scopolamine and oropharyngeal topical anesthesia.
- 3L/min nasal oxygen
- Continue monitor O2saturation, BP
- Forrest classification:
- Endoscopic hemostasis:
  - Epinephrine injection,
  - Heater probe thermocoagulation,
  - Hemoclipping, or a combination approach.

Endoscopic appearance of a bleeding ulcer-Forrest classification (grade IA~III)

※ High-risk lesions:
- grade IA: spurt blood
- grade IB: ooze blood
- grade IIA: nonbleeding visible vessel
- grade IIB: adherent clot

※ Low-risk lesions:
- grade IIC: flat, pigmented
- grade III: clean base

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Methods—ECG

- ECG → standard analysis system:
  - Cardiac arrhythmia:
    - ventricular ectopy (VE): PVC
    - Supraventricular ectopy (SVE):PAC
  - Ischemic ST changes:
    - ST-segment elevation or depression of more than 1 mm for at least 1 minute.
  - Heart rate variability (HRV).

Methods--Autonomic nervous function

- Heart rate variability → autonomic nervous function
- Transferred to:
  - Low-frequency (LF) power (reflecting sympathetic and parasympathetic tones
  - High-frequency (HF) power (indicating parasympathetic tone).
- These HRV indices were calculated and compared in the before, during, and after endoscopy periods,respectively

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Methods--Clinical outcome

- Clinical outcomes:
  - Successful primary hemostasis: cessation of bleeding for at least 1 minute
  - In-hospital recurrent bleeding:
    - Hematemesis/melena persisting for more than 48 hours, and/or a decrease in Hb>2 g/dL
  - Duration of hospital stay
  - Cardiovascular events during hospitalization.

Result--population

- 104 patients recruited into this study → 100 patients (50CAD, 50 non-CAD) completed the examination
- Reasons for withdrawing:
  - Intolerance to endoscopy (n = 1)
  - Failed ECG recording (n = 1)
  - Refusal for further evaluation (n = 2)

Result--population

Table 1   Demographic data from patients with and without CAD

Characteristic	CAD (n = 50)	Non-CAD (n = 50)	P
Age, mean ± SD (y)	71.1 ± 11.5	67.1 ± 11.3	.085
Sex (male/female)	36/14	26/24	.040 *
Smoking (n [%])	13 (26)	4 (8)	.017 *
Previous PUD (n [%])	20 (40)	20 (40)	1.0
Comorbidity			
Diabetes (n [%])	25 (50)	18 (36)	.157
Hypertension (n [%])	41 (82)	30 (60)	.015 *
Hyperlipidemia (n [%])	20 (40)	6 (12)	.001 *
Obesity (BMI ≥27), n (%)	9 (18)	9 (18)	1.0
Heart failure (n [%])	14 (28)	2 (4)	.001 *
Atrial fibrillation (n [%])	5 (10)	0 (0)	.022 *
Renal failure (n [%])	8 (16)	1 (2)	.031 *
Medication			
Aspirin (n [%])	29 (58)	10 (20)	<.001 *
Clopidogrel (n [%])	29 (58)	1 (2)	<.001 *
NSAID (n [%])	7 (14)	10 (20)	.425
Warfarin (n [%])	4 (8)	0 (0)	.118
β-blocker (n [%])	19 (38)	3 (6)	<.001 *
Calcium channel blocker (n [%])	27 (54)	10 (20)	<.001 *
Preendoscopy condition			
Hematemesis (n [%])	5 (10)	6 (12)	.752
Coffee-ground vomitus (n [%])	11 (22)	13 (26)	.644
Melena (n [%])	40 (80)	42 (84)	.602
Lowest SBP, mean ± SD (mm Hg)	109.4 ± 21.7	118.6 ± 25.7	.058
Lowest DBP, mean ± SD (mm Hg)	59.8 ± 14.7	68.5 ± 16.6	.007 *
Fastest HR, mean ± SD (bpm)	96.1 ± 18.3	95.2 ± 20.9	.833
Hemoglobin, mean ± SD (g/dL)	9.8 ± 3.1	9.7 ± 2.8	.889
Troponin I, mean ± SD (ng/mL)	0.17 ± 0.5	0.03 ± 0.1	.060
Blood transfusion (n [%])	32 (64)	29 (58)	.539
Blood transfusion volume, mean ± SD (U)	3.8 ± 2.01	3.7 ± 2.1	.913
Butyl scopolamine use (n [%])	48 (96)	48 (96)	1.0

PUD indicates peptic ulcer disease; BMI, body mass index, indicating weight in kilogram divided by body surface area; bpm, beam per minute; NSAID, nonsteroidal antiinflammatory drug; SBP, systolic blood pressure; DBP, diastolic blood pressure; HR, heart rate.
* P <.05 with the t test or χ² test.

Endoscopic hemostasis

Table 2 Endoscopic bleeders, hemostatic methods, outcomes after endoscopy, and comparisons between the 2 groups

Parameters	CAD (n = 50)	Non-CAD (n = 50)	P
Peptic ulcer	43 (86)	39 (78)	.3
Ulcer size, mean (cm)	0.81	0.82	.967
Forrest Ia (n [%])	2 (4)	0 (0)	.242
Forrest Ib (n [%])	3 (6.)	7 (14)	.318
Forrest IIa (n [%])	6 (12)	12 (24)	.130
Forrest IIb (n [%])	1 (2)	2 (4)	1.000
Forrest IIc (n [%])	8 (16)	4 (8)	.204
Forrest III (n [%])	23 (46)	14 (28)	.051
Angiodysplasia (n [%])	1 (2)	1 (2)	1.0
Therapeutic hemostasis (n [%])	13 (26)	21 (42)	.093
Epinephrine injection (n [%])	12 (24)	16 (32)	.378
Epinephrine volume, mean (mL)	9.9	8.8	.581
Heater probe thermocoagulation	6 (12)	6 (12)	1.0
Endoscopy duration, mean (min)	8.6	10.9	.083
Successful initial hemostasis (n [%])	50 (100)	50 (100)	1.0
In-hospital recurrent bleeding (n [%])	2 (4)	3 (6)	.65
Hospital stay (d)	8.0 ± 17.7	5.3 ± 5.5	.306
In-hospital cardiac death (n [%])	1 (2)	0 (0)	-

Clinical outcomes

- Both groups : no angina or MI before, during ,or after endoscopy.
- Successful primary hemostasis was achieved in all patients.
- 2 patients in the CAD group and 3 in the non-CAD group →recurrent bleeding
  - 4 patients via conservative treatment
  - 1 with CAD→ angiography
- One CAD(3-VD)→ angina 5 days later, and die of VF.

Cardiac arrhythmia and ischemic ST change

Table 3 Electrocardiographic, hemodynamic, and autonomic abnormalities before, during, and after emergency endoscopy, stratified by CAD and non-CAD groups

Parameters	CAD (n = 50)	Non-CAD (n = 50)	P
SVE total number ≥1 (n [%])			
Before	32 (64)	32 (64)	1.0
During	23 (46)	13 (26)	.038 *
After	34 (68)	41 (82)	.106
SVE frequency ≥1/min (n [%])			
Before	4 (8)	4 (8)	1.0
During	8 (16)	1 (2)	.014 *
After	4 (8)	3 (6)	.699
VE total number ≥1 (n [%])			
Before	25 (50)	16 (32)	.067
During	21 (42)	8 (16)	.004 *
After	32 (64)	15 (30)	.001 *
VE frequency ≥1/min (n [%])			
Before	9 (18)	2 (4)	.025 *
During	10 (20)	2 (4)	.014 *
After	10 (20)	0 (0)	.001 *
Ischemic ST changes (n [%])			
Before	6 (12)	1 (2)	.112
During	9 (18)	1 (2)	.016 *
After	9 (18)	1 (2)	.016 *
Maximal HR, mean (bpm)	126.8	131.7	.304
Minimal HR, mean (bpm)	69.5	68.9	.847
SBP, mean ± SD (mm Hg)			
Before	133.0 ± 25.0	135.8 ± 25.7	.583
After	140.4 ± 28.0	146.5 ± 32.7	.318
DBP, mean ± SD (mm Hg)			
Before	73.3 ± 14.6	76.5 ± 16.2	.302
After	74.8 ± 16.6	81.8 ± 20.0	.060
HR, mean ± SD (bpm)			
Before	91.7 ± 15.7	96.5 ± 21.9	.210
After	99.1 ± 15.8	106.5 ± 19.4	.041 *
SpO_2, mean ± SD (%)			
Before	98.5 ± 1.5	98.3 ± 1.7	.704
After	98.4 ± 1.6	98.5 ± 1.3	.734
LF, mean ± SD (ln msec²/Hz)			
Before	3.38 ± 0.18	3.41 ± 0.18	.389
During	3.15 ± 0.35	3.16 ± 0.23	.928
After	3.29 ± 0.17	3.28 ± 0.37	.830
HF, mean ± SD (ln msec²/Hz)			
Before	2.77 ± 0.18	2.80 ± 0.20	.480
During	2.53 ± 0.36	2.53 ± 0.23	.956
After	2.67 ± 0.17	2.65 ± 0.36	.734
LF/HF ratio (mean ± SD)			
Before	4.09 ± 0.37	4.13 ± 0.39	.607
During	4.18 ± 0.37	4.20 ± 0.30	.831
After	4.18 ± 0.25	4.25 ± 0.20	.145

* P < .05 with the Wilcoxon rank sum test or Fisher's exact test.

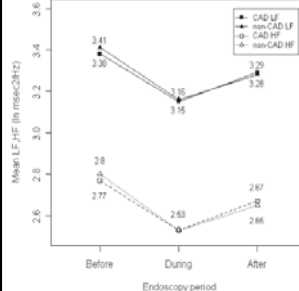## Hemodynamic fluctuations
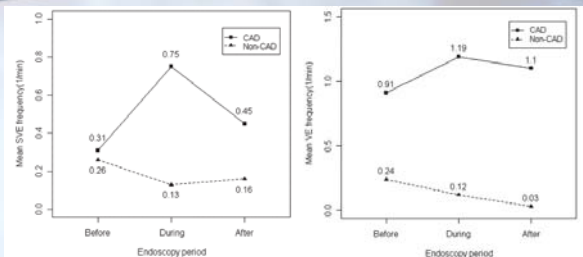
Ischemic ST changes
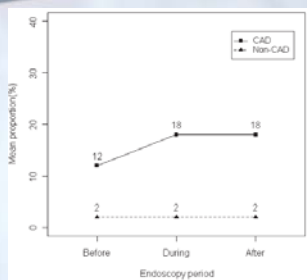
- More episodes were detected in the CAD group during and after endoscopy (P .016)
- Fluctuation was not significant different (P = .18).

Autonomic nervous function

- The LF and HF powers decreased significantlyduring the endoscopy period (P < .01).
- No significant difference between the baseline functions and follow-up autonomic nervous functions.

Risk factor assessment

- With the outcome variable of VE frequency during endoscopy, the presence of CHF was identified as a significant risk factor
- No other risk factor showed significant association with the increase of cardiac events of SVE, ischemic ST change, or autonomic nervous derangement.

Discussion

- The first prospective study.
- Advisers effect of UGIB on CV function:
  - Blood loss→ hypovolemia, hypoperfusion, hypoxemia.
  - Increase HR→ excessive workload
- More difficult hemostasis , and increae re-bleeding rate for CAD patient: due to antiplatelet agent
  - No different in our study

Discussion

- Systemic absorption of epinephrine:
  - 12 CAD patients: received epinephrine injection with an average volume of 9.9 mL (range, 3-20 mL).
  - Compared to alternate hemostatic techniques. The incidence of arrhythmia and MI: No different
- The higher incidences of subclinical myocardial ischemia and cardiac arrhythmias in our study deserve special attention.

Discussion

- The presence of autonomic imbalance is associated with the development of CV complications after endoscopy.
- Insignificant difference in autonomic function between the CAD and non-CAD:
  - Relative short Holter recording(3-4hrs)
  - Small group (n=50)
  - CAD with MI or coronary revascularization → alter HRV
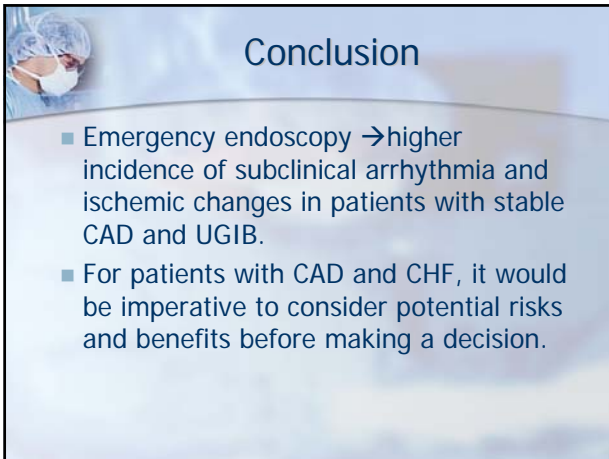 - Medication: CCB, beta-block→HRV

Discussion

- The strength of the study:
  - Comprehensive and detailed recording of ECG abnormalities before, during,after endoscopic procedures
  - Establish the risk factors →predicting clinical outcomes before performing endoscopic assessment.
  - Enrolled a control group

Limitation

- No assess the use of sedation:
- Non-CAD patients had occult CAD
- Small sample size
- Diagnosis of CHF → clinical history taking→ not reflect the true cardiac function before endoscopy.
  - Echocardiography for LVEF → preendoscopy evaluation for these high-risk patients with CAD in future practice.

Conclusion

- Emergency endoscopy →higher incidence of subclinical arrhythmia and ischemic changes in patients with stable CAD and UGIB.
- For patients with CAD and CHF, it would be imperative to consider potential risks and benefits before making a decision.

Thanks for your attention!!!!