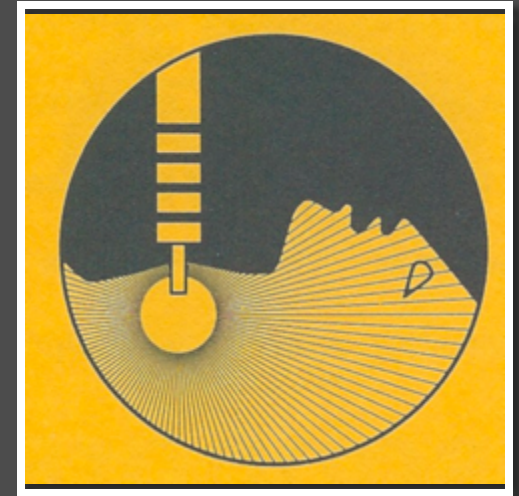




HISTOIRE DE L'IMAGERIE DES GLANDES PARATHYROÏDES

Jean-François Moreau, Professeur émérite
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Radiologiste honoraire de l'hôpital Necker

AU XX^E SIÈCLE,
UN ROMAN À ÉPISODES PALPITANT

L'hyperparathyroïdie:
de l'exceptionnel à la banalité...
de la sérendipité à la routine...
de l'aveuglement à la lumière...



1890: FRIEDRICH DANIEL VON RECKLINGHAUSEN

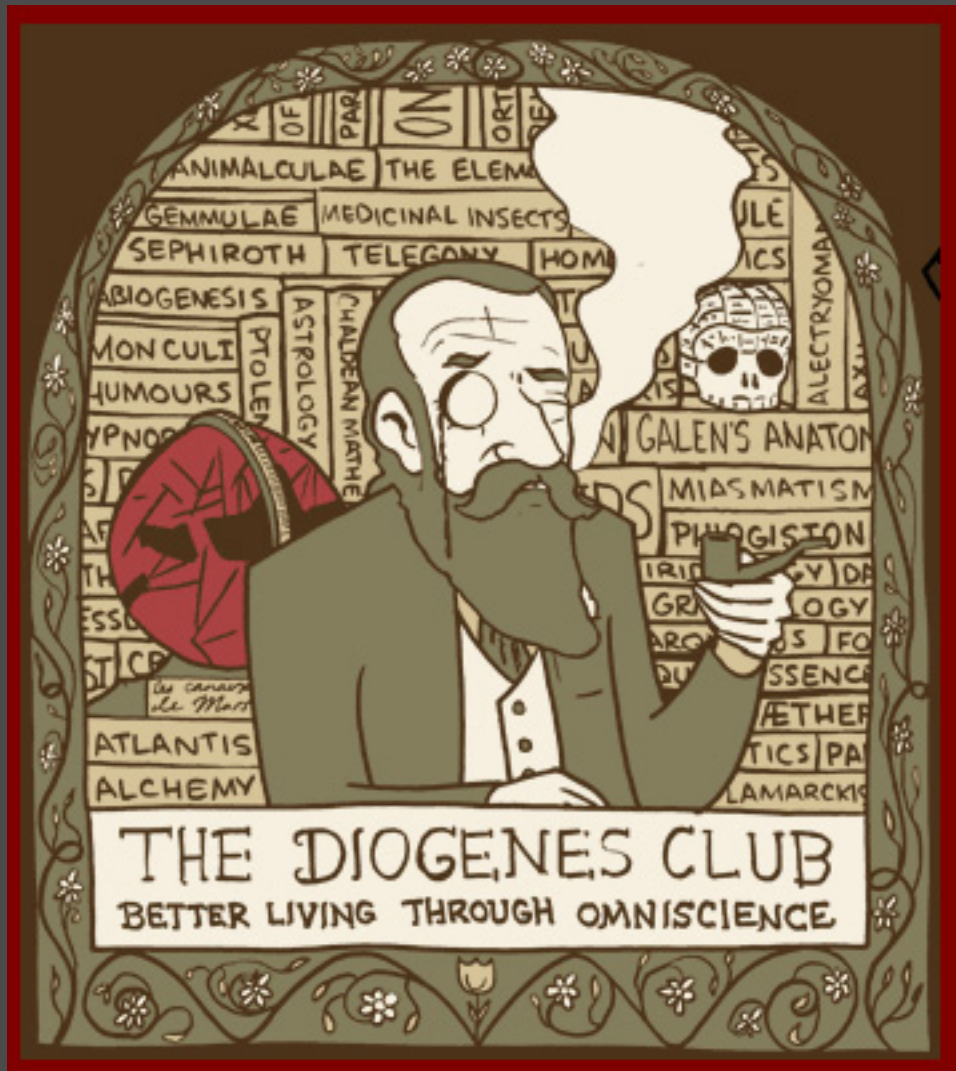
décrit à Strasbourg une nouvelle maladie:

l'ostéite fibrokystique

Demonstration von Knochen mit tumor bildendor Ostitis deformans

UNE ÉNIGME À RÉSOUDRE:

À l'orée du XXI^e
siècle,
seule et unique
inconnue
en matière
d'iconographie
médicale
macroscopique
non sanglante:





UNE ÉNIGME À RÉSOUDRE:

À l'orée du XXI^e siècle,

Aucune
technologie
ne parvient
à imager
les glandes
parathyroïdes
normales!

La parathyroïdectomie
totale
entraîne la mort
rapide
dans un tableau de
tétanie.

*"Jamais dans l'Histoire un si
petit nombre d'hommes n'a
tenu entre ses mains le destin
d'un si grand nombre".
Churchill.*

Imagerie de l'hyperparathyroïdie primaire

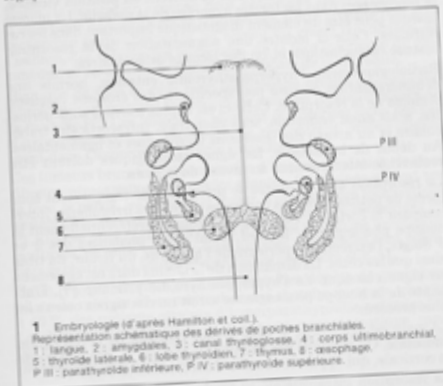
X. Belin
F. Cyna-Gorse
P. Lacombe
O. Helal

D.-W. Foster
O. Barre
M. Souissi
J.-F. Moreau

L'hyperparathyroïdie primaire est une pathologie dont la fréquence d'être négligeable puisqu'elle atteint environ un individu sur 500. L'hyperparathyroïdie survient plus fréquemment chez la femme et 50 ans, mais tous les âges peuvent être concernés. Si le bilan biologique est la clef de voute du diagnostic, l'imagerie joue un rôle important dans la préchirurgie.

Rappel embryologique et anatomique

L'exploration des glandes parathyroïdes nécessite une bonne connaissance de l'anatomie et de ses variantes, qui découlent logiquement de l'embryogenèse.



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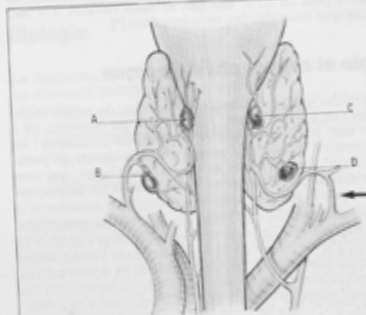
D.-W. Foster : Ancien chef de clinique-assistant.

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Normalement au nombre de quatre, les parathyroïdes des 3^e et 4^e poches endobranchediales, lesquelles participent à la formation du thymus (fig. 1).

Les parathyroïdes inférieures appelées également P.III du récessus dorsal de la 3^e poche endobranchediale, où le récessus ventral donne naissance au thymus. Lors de la médianisation, la parathyroïde inférieure et le thymus entraînés en avant et vers le bas, puis se séparent. Le thymus continue sa descente vers le médiastin antérieur au moment où survient cette séparation, la glande soit en position normale ou sub-normale au pôle inférieur thyroïdien, soit en situation ectopique. Les glandes, pour être en position normale en arrière du pôle inférieur thyroïdien (fig. 2), alors que 26 % à 39 % d'entre elles sont



Toute référence à cet article doit porter la mention : BELIN X., CYNAGORSE F., LACOMBE P., HELAL O., FOSTER D.-W., BARRE O., SOUSSI M., MOREAU J.-F. - Imagerie de l'hyperparathyroïdie primaire. - Encyclopédie Technique, - Encyclopédie Médico-Chirurgicale - Paris, 1992.



"Jamais dans l'Histoire, un si petit nombre d'hommes n'a tenu entre ses mains le destin d'un si grand nombre". Churchill, 1940.



UNE SINGULARITÉ:

À peau fermée,
les glandes
parathyroïdes
ne sont
macroscopiquement
identifiables *in vivo*
que lorsqu'elles sont
**pathologiquement
hypertrophiées!**



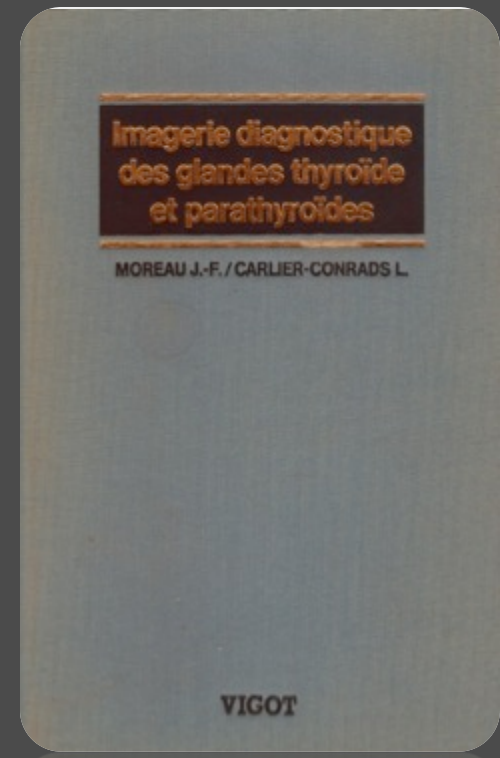
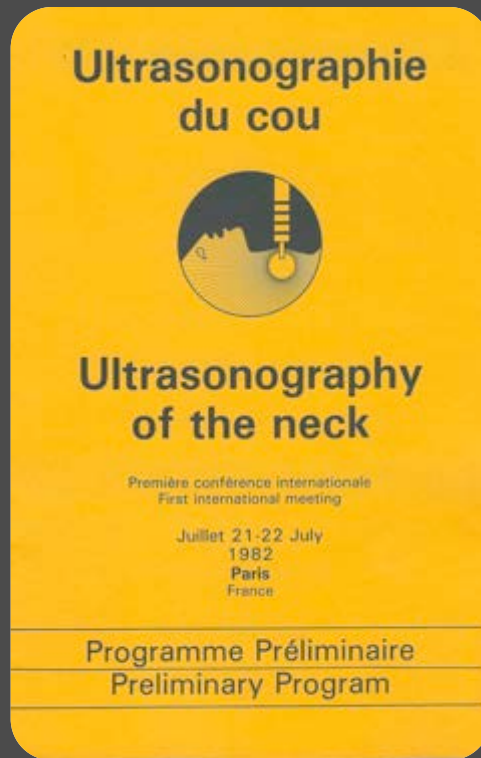
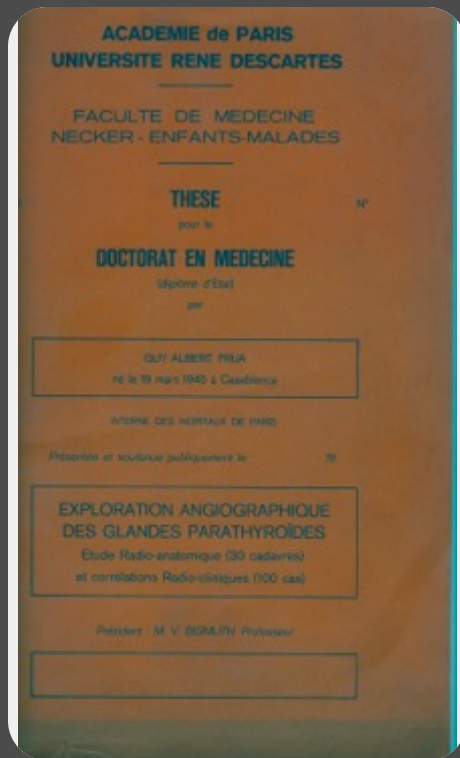
Il/elle a raison!

Seul(e),

**le/la chirurgien est
(doit être)**

**capable de reconnaître
les glandes
parathyroïdiennes
normales**

**per-
opératoirement...**



TROIS MONUMENTS HISTORIQUES

se report states that 62 per cent of the cases were icteric, it follows that 38 per cent were anicteric.

Although our data did not demonstrate a reduction in the incidence of post-transfusion hepatitis with the use of large amounts of frozen and washed red cells, it is encouraging that Dr. Telischak and Mr. Hoiberg do have evidence that washed blood diminishes its incidence.

Regarding Dr. Lee's letter, it seems to me that increasing the volume of the wash solution to 3 or 4 liters will produce a different outcome, in view of the fact that Barker,⁴ in a later paper than the one cited by Dr. Lee, showed that an infectious plasma pool (hepatitis B surface antigen) diluted 10 million times was still infectious. I share with Dr. Lee the hope that frozen red cells and washed cells will continue to be used, for I believe that they have an important, valuable role in blood-component therapy.

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*Barker LF, Murray R. Relationship of virus dose to incubation time of nical disease and time of appearance of hepatitis-associated antigen. *Am J Med Sci*. 1972; 263:27-33.

LOCALIZATION OF PARATHYROID TUMORS BY ULTRASONOGRAPHY

To the Editor: The recent article by Edis and Evans¹ in the *Journal* sets the problem of accurate preoperative localization of parathyroid masses with commercially available ultrasonographic equipment. According to Sample et al.,² ultrasonographic diagnosis of parathyroid enlargement can be made when the mass diameter is greater than 0.5 cm. The lightest adenoma localized by Edis and Evans, who used a prototype instrument with real time and a 7-MHz transducer, weighed 0.37 g. The smallest adenoma that they localized measured 1 by 1 by 0.3 cm. Karo et al.³ accomplished preoperative sonographic localization of a parathyroid mass in six of 30 unselected patients.

We have studied more than 100 patients with thyroid nodules and no evidence of parathyroid dysfunction, using a new B-mode sonograph with digital memory, 16 shades of gray (Sonia, C.G.R., France), and a nonfocused 7-MHz transducer, without real time and coupling bag of water. We were not able to localize the parathyroid glands in any of these patients. The same technique was used, beginning in July 1979, in 13 unselected patients with primary hyperparathyroidism and in three patients with secondary hyperparathyroidism. Precise sonographic localization of a parathyroid enlargement was accomplished in eight of these patients. It was confirmed surgically in five of these eight. Our first case of localization is being published.⁴ The heaviest adenoma weighed 5.5 g, and the lightest 0.2 g. The diameter of the smallest was 0.75 cm. A parathyroid enlargement was suspected in five of ten other patients, but they have not yet been studied surgically. Our conclusion is that the precise location of a parathyroid mass can be determined by means of high-resolution ultrasonographic equipment without real time, and that a score better than that indicated by Karo et al.³ can be obtained. It must be noted that the risks of false-positive and false-negative diagnoses are numerous but decrease with increasing experience. The greatest difficulties result in pseudotumoral artifacts induced by manual scanning and in ectopic locations. Parathyroid adenomas can give echogenic or anechoic patterns. In our opinion, the best sign of a parathyroid is the thin, well-defined interface separating the parathyroid from the thyroid lobe more than the echogenic structure. That interface must be seen on sagittal as well as transverse views of the gland.

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1. Edis AJ, Evans TC Jr. High-resolution, real-time ultrasonography in the preoperative localization of parathyroid tumors: pilot study. *N Engl J Med*. 1979; 301:532-4.
2. Sample WF, Mitchell SP, Bledsoe RC. Parathyroid ultrasonography. *Radiology*. 1978; 127:485-90.
3. Karo JJ, Maas LC, Kaine H, Gelzayd EA. Ultrasonography and parathyroid adenoma. *JAMA*. 1978; 239:2163-4.
4. Moreau JF, Drucke T, Flury J, Dubost C. Preoperative ultrasonographic localization of parathyroid adenoma. *Lancet*. (in press).

The above letter was referred to Drs. Edis and Evans, who offer the following reply:

To the Editor: Moreau et al. were able to localize parathyroid tumors in five of 13 unselected patients by means of a standard commercially available gray-scale sonograph. Others¹⁻⁴ have had similar success in isolated cases without the aid of technically sophisticated instrumentation such as computer-assisted, real-time display. It is claimed that conventional ultrasonographic equipment can be used to diagnose parathyroid enlargement when the tumor is as small as 0.5 cm in diameter.⁴ Whether this represents the consistent capability of the method or simply a "flash in the pan" remains to be seen, and it is pointless to compare the different types of ultrasound hardware and software until data are available from systematic, large-scale examinations of unselected patients with hyperparathyroidism.

We have been encouraged by the results of our own pilot study¹ to embark on such a project, using a new, commercially available, high-resolution, real-time ultrasonograph (Biosound, Biodynamics) that has a theoretical limit of resolution of 0.3 mm. It is our hope and expectation that ultrasonography will ultimately prove to have widespread applicability as a safe, noninvasive, low-cost, and reliable tool for parathyroid localization.

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1. Crocker EF, Bautovich GJ, Jellins J. Gray-scale echographic visualization of a parathyroid adenoma. *Radiology*. 1978; 126:233-4.
2. Karo JJ, Maas LC, Kaine H, Gelzayd EA. Ultrasonography and parathyroid adenoma. *JAMA*. 1978; 239:2163-4.
3. Bambach CP, Riley JW, Pickler RH, et al. Preoperative parathyroid identification by ultrasonographic scan. *Med J Aust*. 1978; 2:227-9.
4. Sample WF, Mitchell SP, Bledsoe RC. Parathyroid ultrasonography. *Radiology*. 1978; 127:485-90.
5. Edis AJ, Evans TC Jr. High-resolution, real-time ultrasonography in the preoperative localization of parathyroid tumors: pilot study. *N Engl J Med*. 1979; 301:532-4.

POSSIBLE PROLONGATION OF REMISSION IN ACUTE

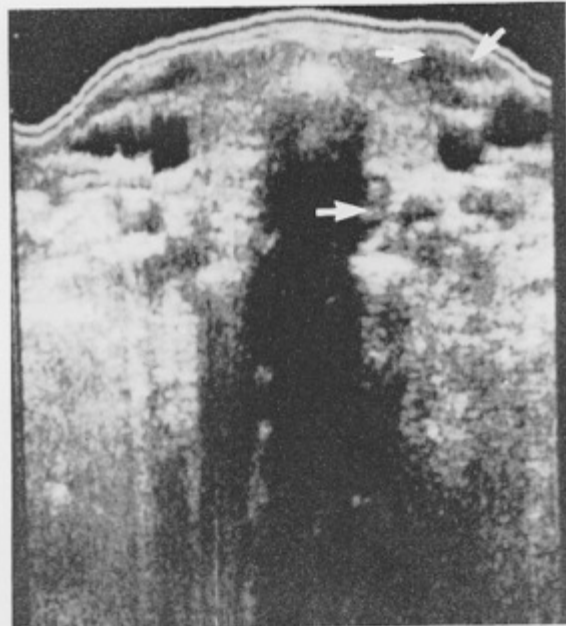
© 1981, Masson, Paris

J.-F. Moreau*, C. Dubost**, J.-N. Buy*, J. Ferry**

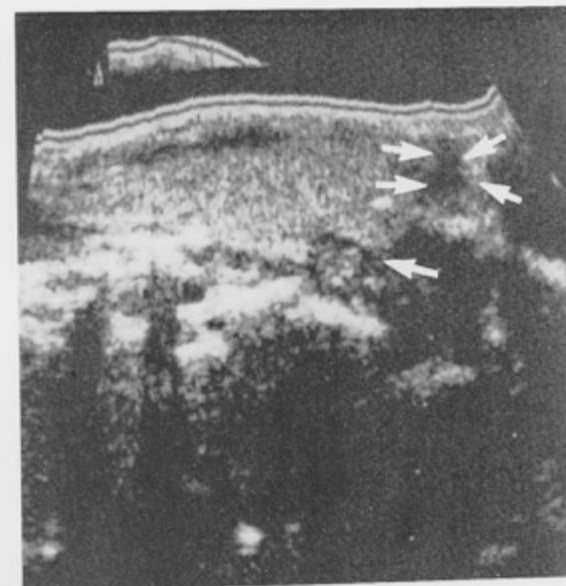
MEMOIRE

Dépistage ultrasonographique pré-opératoire des adénomes parathyroïdiens

Il n'existe actuellement aucune méthode qui soit à la fois simple, inoffensive, économique et fidèle pour préciser la situation d'un adénome parathyroïdien chez les malades hyperparathyroïdiens avant l'exploration chirurgicale du cou et éventuellement du médiastin. L'échographie ultrasonore de la région cervicale possède les 3 premières qualités. Il faut en étudier la fiabilité et les limites, que la physique des ultrasons utilisés en médecine ne permettent pas de dépasser (N.P.M.).



a)



b)

Les axes artériels sont souvent volumineux et très pulsatiles. Les veines sont beaucoup plus

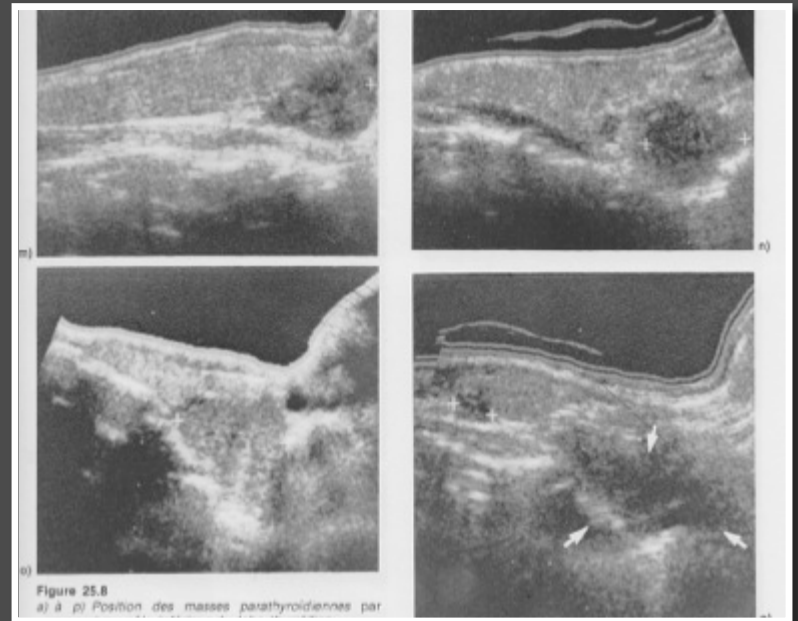
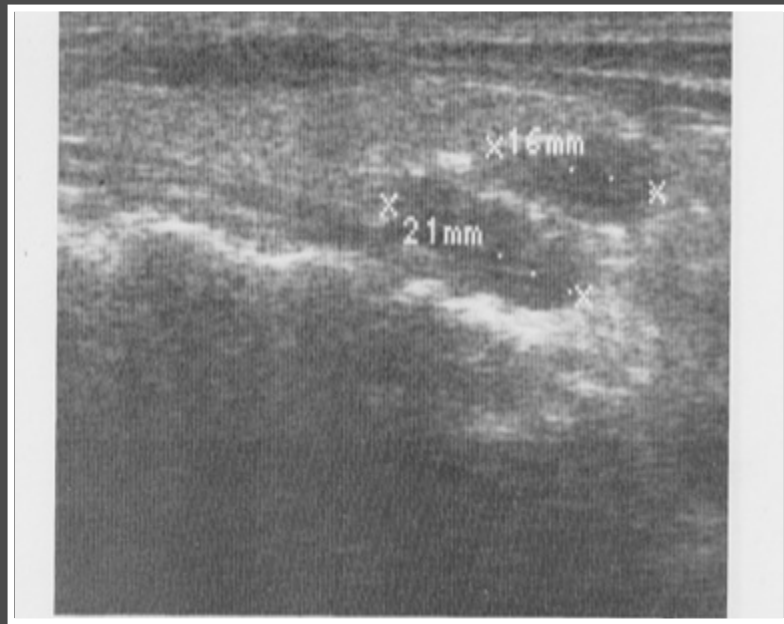
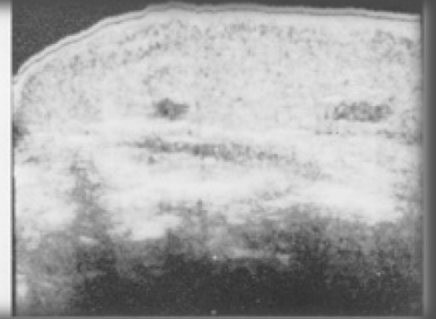
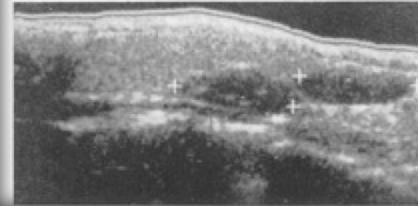


Figure 25.8
a) à d) Position des masses parathyroïdiennes par

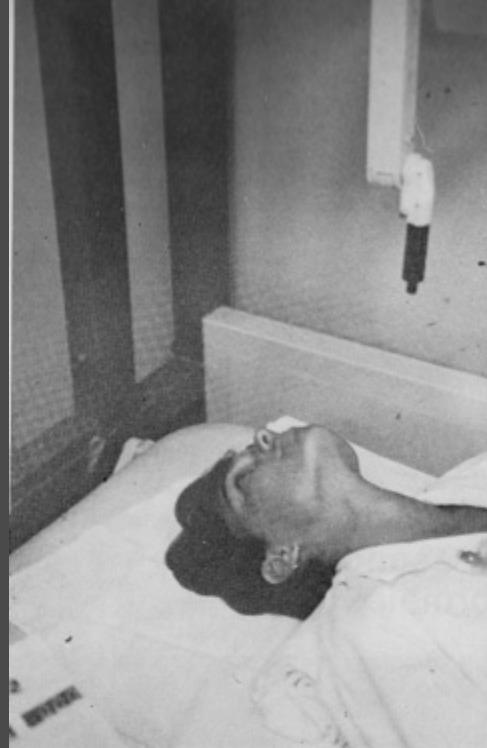
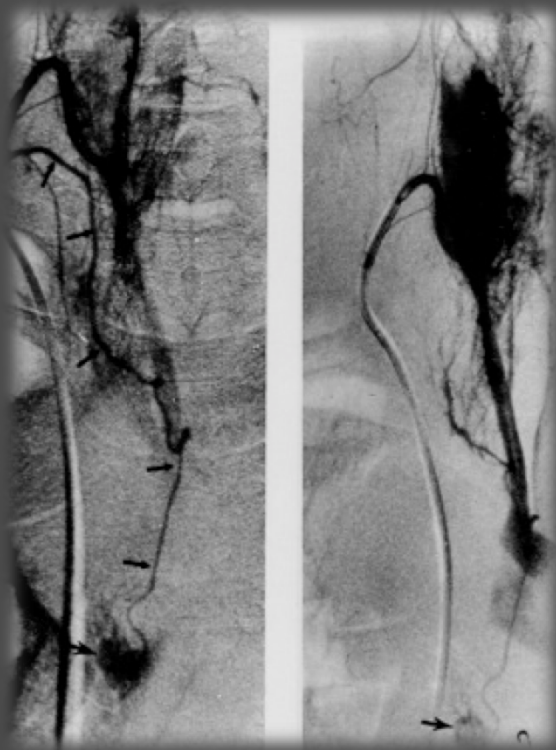


Figure 5.1
Position optimale pour l'échographie cervicale.

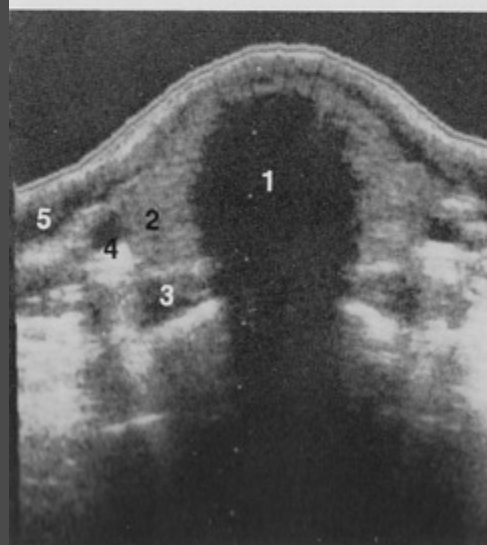
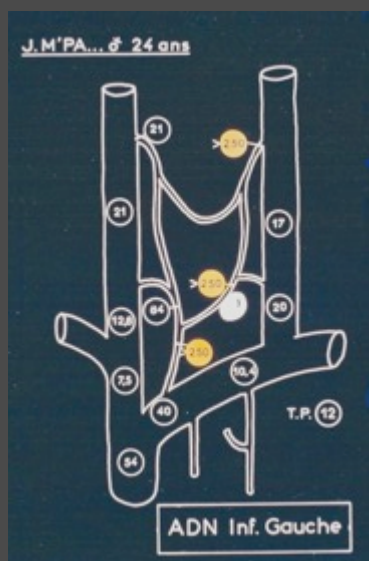


Figure 5.2
Coupe transversale trans-isthmique.
1- Axe trachéal. 2- Thyroïde. 3- Larynx.

