ORIGINAL ARTICLE

The female inferior hypogastric (= pelvic) plexus: anatomical and radiological description of the plexus and its afferences—applications to pelvic surgery

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Abstract

Aim of the study We wanted to determine the anatomical features of the inferior hypogastric plexus (IHP), and the useful landmarks for a safe surgical approach during pelvic surgery.

Materials and methods We dissected the IHP in 22 formolized female anatomical subjects, none of which bore any stigmata of subumbilical surgery.

Results The inferior hypogastric plexus (IHP) is a triangle with a posterior base and an anterior inferior top. It can be described as having three edges and three angles; its inferior edge stretches constantly from the fourth sacral root to the ureter's point of entry into the posterior layer of the broad ligament; its cranial edge is strictly parallel to the posterior edge of the hypogastric artery, along which it runs at a distance of 10 mm; its posterior (dorsal) edge is at the point of contact with the sacral roots, from which it receives its afferences. They most frequently originate from S3 or S4 (60%) and then, in one or two branches, often from S2 (40%), never from S1 and in exceptional cases from S5 (20%). There are sympathetic afferences in 30% of cases, usually through a single branch of the second, third or fourth sacral ganglion. All IHPs have at least one sacral afference and sometimes there may be up to three afferences from the same sacral root. Its dorsal cranial angle, which

is superior, comes after the SHP (hypogastric nerve or presacral nerve filament); its anterior inferior angle is located exactly at the ureter's point of entry into the posterior layer of the broad ligament. This is the top of the IHP; its posterior inferior angle is located at the point of contact with the fourth sacral root. At its entrance at the base of the parametrium the pelvic ureter is the anterior, fundamental positional reference for the IHP. The vaginal efferences come out of the top of the IHP through branches leading to the bladder, the vagina and the rectum, which originate through two trunks exactly underneath the crossing point of the ureter and the uterine artery: (i) one trunk leading to the bladder runs along and underneath the ureter and divides into two groups, which are lateral and medial, trigonal. (ii) the trunk leading to the vagina runs along the inferior edge of the uterine artery. At the point of contact with the lateral edge of the vagina, it splits into two groups: anterior thin and posterior voluminous. Some of its branches perforate the posterior wall of the vagina and are distributed to the rectovaginal septum in a tooth comb pattern. The inferior branches, which emerge from the inferior edge of the IHP, reach the rectum directly. The dissection of the 22 specimens allowed us to describe three efferent plexuses: a vaginal rectal plexus, a vesical plexus and a inferior rectal plexus. So the IHP's anterior, fundamental positional reference is the pelvic ureter at the point where it enters at the base of the parametrium, then at the crossing point of the uterine artery. The ureter is the vector for vesical efferences, the uterine artery is the vector for vaginal efferences, which are thus sent into the vesicovaginal septum and the rectovaginal septum. This surgical point of reference is of vital importance in nerve sparing during the course of a simple or extended hysterectomy. Any

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dissection carried out underneath and outside of the ureter inevitably carries a risk of lesions to its efferent, lateral vesical or medial, rectovaginal fibres.

Introduction

In 1898, Wertheim described the first total abdominal hysterectomy technique combined with a pelvic excision in the surgical treatment of cancer of the cervix. Schauta described the operation he performed vaginally in 1902. Whether this so-called extended hysterectomy is performed abdominally or vaginally, in a good number of cases it is followed by the occurrence of postoperative bladder problems, which can sometimes be incapacitating and prolonged. These problems may be of types involving either retention or incontinence and loss of bladder sensitivity, which are all the more unpleasant when they occur in young female patients.

A number of hypotheses have been put forward with regard to the cause of these postoperative mictional disorders [5]. The first, posited by Latarget and Rocher in 1922, mentioned the possibility of a lesion of the hypogastric plexus, which would explain the bladder problems observed. Over the years, these latter have been connected to a more or less complete surgical denervation of the bladder by a section of the hypogastric plexus and/or its vesical branches.

We aimed to specify the precise topography of the inferior hypogastric plexus and, above all, in order to define the points of reference which would help us to deal with this when performing a hysterectomy.

Materials and methods

In order to study the inferior hypogastric plexus (IHP), we dissected 22 female formolised hemipelvises, none of which showed any stigmata of subumbilical surgery. Twenty one subjects had undergone no pelvic or abdominal surgery, one subject had undergone a hysterectomy which had been performed vaginally.

The dissection was always performed in the following manner: the first stage consists of disarticulating the lower limbs. Then the subjects were cut transversally using a band saw, after congelation, as far as the umbilicus in order not to damage the superior hypogastric plexus. We then performed the opening followed by the ablation of the ventral and ventrolateral abdominal wall following a longitudinal incision made from the umbilicus to the pubis, which will then be continued opposite the inguinal ligament and beyond it as far as the top of the iliac wing. There then follows the exeresis of the digestive tract in a block as far as the sigmoid. The dissection then continued as far as the rectosigmoid junction, which was ligated and severed. The ablation of the remaining peritoneum and that of the rectouterine excavation (Douglas pouch) was performed.

We identified the nerve filament of the intermesenteric plexus which is in a pre-aortic position. This nerve filament did act as "the guide" for the remainder of our dissection hence the importance of revealing it at an early stage. Continuing on from the intermesenteric plexus, the superior hypogastric plexus was located underneath the aortic bifurcation, in a ventral position in relation to the sacral promontory.

At this stage in our progress, a further deep freezing was performed allowing a median sagittal cut to be made. This cut offered a median approach to the hemipelvis for a precise dissection, taking care over the positional references and structure of the nerves being studied as well as their afferences. The superior hypogastric plexus caudally and laterally leaded to the right and left hypogastric nerves. These nerves did expand taking on the appearance of a triangular nerve filament with a ventral top, the IHP. The homolateral hypogastric nerve arrives at the dorsal cranial angle of the IHP.

The dissection continues dorsally to complete the study of the afferences, moving in the direction of the sacral roots and cranially.

We used the natural cleavage plane between the genital organs and the lateral wall of the pelvis where we were able to descend as far as the pelvic floor. A wide incision was made through the pelvic floor at this level, around the endopelvic base of the genital organs. We could then pull back the genital organs in order to make it easier to dissect the inferior hypogastric plexus on the lateral surface of the genital organs and to do this more accurately. Repositioning the genital organs into their anatomical position allowed a precise analysis of the positional references and the position of the inferior hypogastric plexus.

At each of the stages of the dissection, in addition to a careful dissection of the nerve structures being studied, we made every effort to conserve and identify the vascular elements along with the ureter. These anatomical structures allowed us to specify the positional references and location of the inferior hypogastric plexus and its afferences (pelvic splanchnic nerves or erector nerves of ECKHARDT), of the efferent plexuses and the nerve anastomoses.

MRI study

Having defined the anatomical landmarks for the IHP, we can get a better understanding of the IHP using magnetic resonance imaging. The study was carried out with five female patients who had not undergone hysterectomies on standard cuts in the three planes of space: the strict axial, coronal and sagittal planes. Five MRI cuts were selected, each of them drawn from a series of different cuts.

The imaging examinations were performed on a latest generation Philips 1.5 Tesla MRI scanner.

The chosen examination protocol included firstly Turbo spin echo T2 sequences which are conventionally used in pelvic imaging, performed in the three planes of space in contiguous cuts with a thickness of 3 mm (TE = 98 TR = 2451.15); Secondly rapid sequences known as Balance FFE (TE = 1.961 TR = 3.922) used in imaging of pelvic static disorders also performed in the three planes of space but in thicker contiguous cuts of 5 mm. These latter sequences have the advantage of a strong weighted T2 contrast, a very good definition of the organ contours but above all, very good visibility of the vascular structures and pediculates, even of those with a slow flow.

No T1 sequences were performed, as they are not well enough contrasted, nor were there any sequences with the injection of Gadolinium, the purpose of this latter being to simplify the examination.

The use of finer cuts measuring 2 mm was tried but it turned out to be of no interest, the thicker cuts (BFFE) being deemed to make the best contribution.

Results

Topographic anatomy of the nerve structures

Superior hypogastric plexus (SHP)

The inferior mesenteric plexus is individualised opposite the inferior mesenteric artery, which receives the sympathetic fibres from the paravertebral sympathetic trunk. This tangle of nerve fibres makes up two nerve filaments, which lead to the anterior surface of the aorta directly to its contact and join up with one another opposite the aortic bifurcation, in front of the promontory to form the SHP. It then leads into a flat fibrofatty filament, which is retroperitoneal and located underneath the aortic bifurcation at the point of contact with the promontory. This is a single and median structure.

Hypogastric nerves (presacral nerves)

Underneath the promontory, the SHP divides into two filaments of variable width (4–7 mm depending upon the subject which are called presacral (or hypogastric) nerves (Fig. 1).

This plexus leads laterally to the point of contact and in front of the sacrum, outside of the anterior sacral foramens. It takes an anterior inferior oblique direction with a concave path leading inwards. It is located underneath and inside the internal iliac vessels in the retroperitoneal fat. On the inside it is contact with the sigmoid and then with the rectum. It then plunges into the inferior hypogastric pelvic plexus.

Pelvic or hypogastric inferior plexus (IHP)

It took the shape of a triangle with a posterior base and an anterior inferior top (Fig. 2). We could describe it as follows:

Three edges

a cranial edge strictly parallel to the posterior edge of the hypogastric artery. It runs along the posterior edge of the artery both inside and behind, at a distance of 10 mm. Only once was this distance greater (30 mm), but this was with a woman whose spinal column was extremely deformed.

a dorsal edge, at the point of contact with the sacral roots, receives the afferences from it.
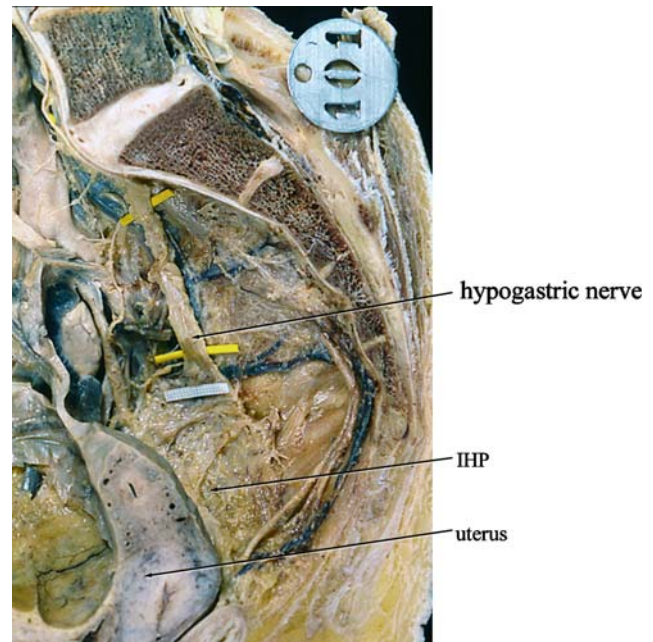

Fig. 1 Posterior part of the IHP and its main afference, the hypogastric nerve. Underlain by the plastic-coated marker, it ends at the dorsal cranial angle of the IHP

a caudal edge, extending from the fourth sacral root to the ureter's point of entry into the posterior layer of the broad ligament.

Three angles

a superior angle which makes up the origin of the pelvic plexus following on from the homolateral hypogastric nerve.

an anterior inferior angle which is located exactly at the ureter's point of entry into the posterior layer of the broad ligament. This is the top of the IHP.

a posterior inferior angle at the point of contact with the fourth sacral root.

Positional references for the IHP

The vascular positional references are arterial and venous

The positional references of the arteries: the IHP runs along the posterior edge of the inferior hypogastric artery. Its posterior superior edge is 10 mm away from it.

The positional references of the veins: the IHP covers the deep surface of the sacrum. Its location in relation to the veins is constant: the superior angle of the IHP crosses the source of the hypogastric vein (confluent of the dorsal cranial venous trunks of the hypogastric vein). Its angle is at 10 ± 5 mm from the vein confluent and 36 mm from the hypogastric vein's termination angle, when it joins the external iliac vein (25–35 mm) (Fig. 2).

The pelvic visceral positional references

The ureter is an essential positional reference for the IHP: not in terms of its superior angle, the distance of which to the ureter is variable, but in terms of its top, in other words its (anterior) inferior angle: in all cases this top is at the ureter's point of contact where it perforates the posterior layer of the broad ligament.

Afferences of the IHP

In addition to the hypogastric nerve, which offer its nervules to the dorsal cranial angle, the sacral roots and the sacral sympathetic trunk also play a part in the makeup of the IHP.

These afferences are variable in terms of their origins but also in terms of how many of them there are (Figs. 2, 3).
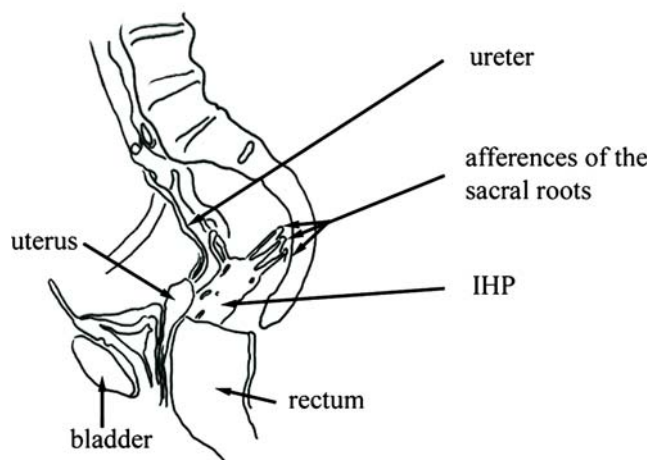

Fig. 2 Sagittal view of the pelvis. The anterior half of the IHP is masked by the pelvic organs. The afferences of the sacral roots (S2, S3, S4) are clearly visible at its posterior pole

Their origins could be systematised as follows:

From the sacral roots: never from S1, almost once in two times from S2 (40%), and once in five times from S5 (20%). On the other hand in 60% of cases there was an afference coming from S3 or S4.

From the sacral sympathetic trunk in 30% of cases and more precisely from the sacral ganglions: seven times, there is an afference, coming from the second sacral ganglion, from the third or fourth (Fig. 4).

The numbers of branches coming from each root were as follows:
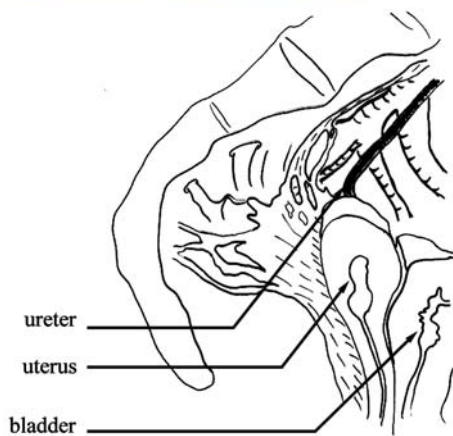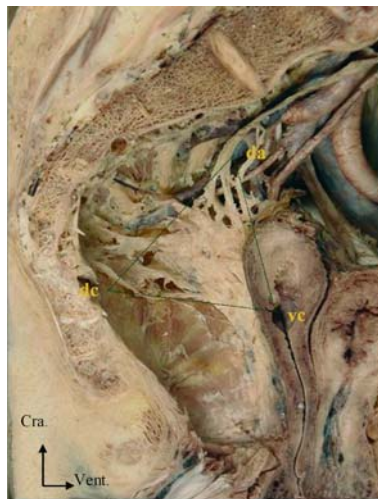
None on one specimen
From S1: none

Fig. 3 Lateral, endopelvic view of the IHP. The *dotted lines* mark the limits of the IHP and underline its triangular shape. *da* dorsal cranial angle, *dc* dorsocaudal angle, *vc* projection of the ventro-caudal angle, pinned against the left-hand surface of the vagina

From S2: one branch out of nine dissections, but never more than one (40%).

From S3: one branch out of five specimens, two branches out of three specimens, three branches out of five specimens.

From S4: one branch out of six dissections, two branches out of seven specimens

From S5: one branch out of four specimens, but never more than one (20%).

The sympathetic afferences were found on seven specimens (30%), on five occasions this was a single afference and on two occasions there were two branches.

Efferences of the IHP

The efferences of the IHP leaded into the vesicovaginal septum and the rectovaginal septum. The vaginal effer-
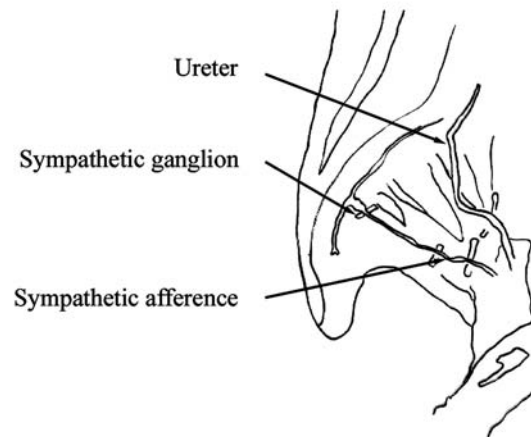

Fig. 4 Afference coming from a sacral sympathetic ganglion or sacral splanchnic nerve here shown by the three inferior plastic-coated markers

ences came out at the top of the IHP, through branches leading to the bladder, the vagina, the uterus and the rectum, which originated in two trunks exactly underneath the crossing point of the ureter and the uterine artery (Fig. 5):

– a lateral trunk, leading to the bladder, is located outside and underneath the ureter (Fig. 6). At the point where the ureter leads into the wall of the bladder, it divides into two groups: a lateral group spreads out over the lateral and inferior wall of the bladder (Fig. 7); a medial, trigonal group heads towards the posterior lateral angle of the trigone and perforates the muscularis without ever directly reaching the vesical sphincter. The linear and medial distribution of these efferences towards the vesical trigone gives them an intimate relationship with the septum
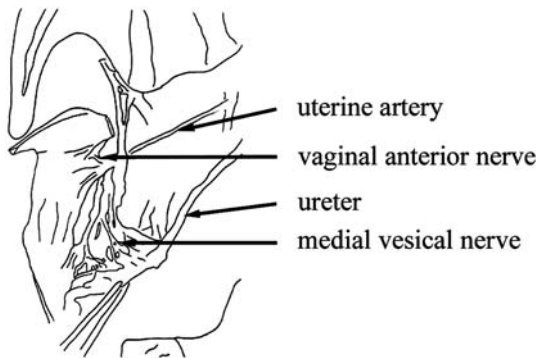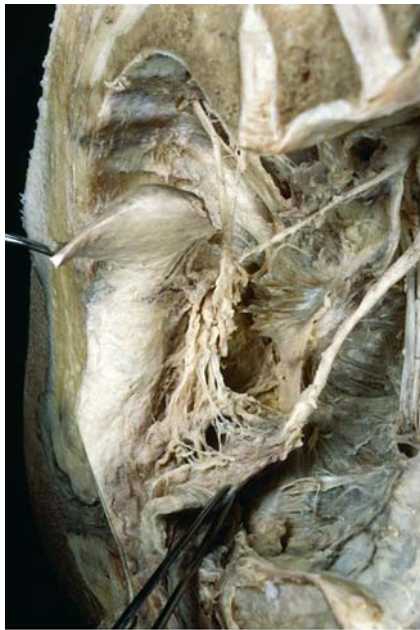
Fig. 5 Vaginal efferences they run along the uterine artery, reach the vesicovaginal septum and spread out over the anterior vaginal wall and the posterior surface of the bladder (pulled forwards by the dissecting forceps)

Fig. 6 Origin of the vesical lateral group in front of and outside the ureter

So we need to remember the essential positional reference of the efferences of the IHP: the ureter. The intersection with the uterine artery precisely locates the emergence of the vesical and vaginal efferences. The uterine artery allows them to be individualised, because the division into lateral and medial groups is made directly below the intersection, just underneath it. Then the vaginal efferences run along the uterine artery and the vesical efferences run along the terminal segment of the ureter, underneath and outside of it.

Anatomy of the IHP in MRI

We have selected images in a series of sagittal cuts in a T_2 weighted sequence where the following were simultaneously identifiable from rear to front: the fatty pararectal space, the paracervix and the bladder all in hypersignal and below that the levator muscle of the anus in hyposignal.

– We choose the first image going outside of the rectum. We define this cut as being the "pararectal" reference cut (Fig. 8a, b).

The following guides were selected: posterior inferior surface of the bladder; afference of the presacral filament; sacral splanchnic afferences; lateral surface of the rectum.

located between the bladder and the vagina, which separates it from the vaginal efferences.

– the medial trunk leading to the vagina runs along the inferior edge of the uterine artery. At the point of contact with the superior part of the lateral edge of the vagina, it divides into two groups: anterior thin and posterior voluminous.

The anterior group was distributed across the whole height of the vagina in a "fan" shape (Fig. 5). It provided the innervation of the anterior 2/3 of the vagina.

The posterior group is located inside and underneath the ureter. Its branches perforate the posterior wall of the vagina and are distributed to the rectovaginal septum in a tooth comb pattern. Branches located further down, emerging from the inferior edge of the IHP, reach the rectum directly.
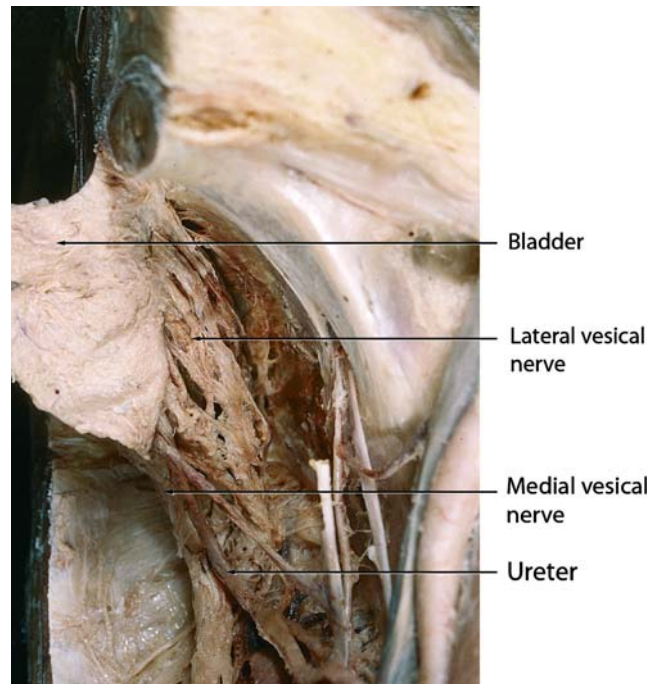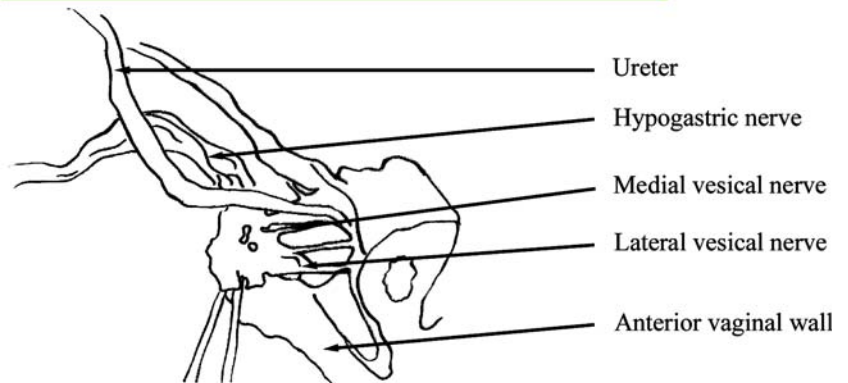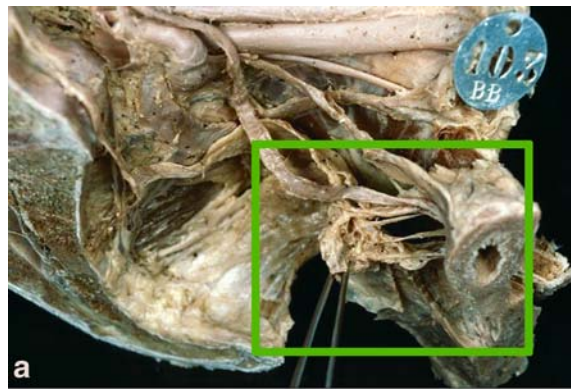
Fig. 7 a Path of the vesical medial group underneath the ureter as far as the posterior surface of the bladder. **b** The nervules remain confined underneath the ureter and reach the posterior surface of the bladder laterally, at the vesical trigone

We then carried the points of reference defined in this way over to the MRI cuts. The projection of the IHP is thus obtained on the right "pararectal" reference MRI cut. This projection essentially affects the hypersignal zone identified previously: the fatty pararectal space, the paracervix and the bladder.

In the same way:

– the "hypogastric" cut, up to the piriform muscle allows us to locate the IHP behind the parametrium (Fig. 9). We selected images in a series of sagittal cuts in a T_2 weighted sequence where we can see the path taken by the hypogastric artery.

We choose the first image showing the distribution of the branches of the hypogastric artery up to the inferior edge of the piriform muscle. We define this cut as being the "hypogastric" reference cut. The MRI aspect of the IHP is heterogeneous with zones of hypo and hypersignal showing the rich vascularisation of the parametrium.

Its limits in MRI were: in front the posterior superior edge of the internal obturator muscle; above: the visceral peritoneum with its intestinal loops; behind and below: the levator muscle of the anus.

– the frontal "uterosacral" cut offers the same way of identifying the IHP on the lateral surface of the rectum, inside the uterosacral ligaments;

Finally we selected the first image going above the neck of the bladder. We define this cut as being the so-
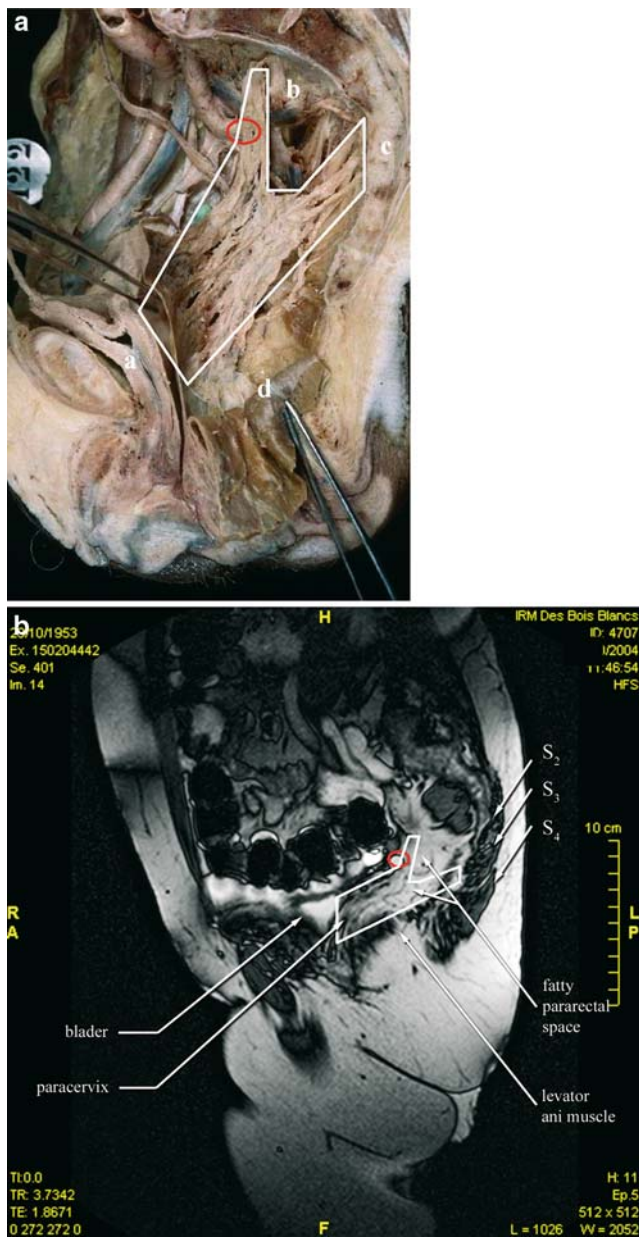
Fig. 8 a Endopelvic view of the IHP, with the points of reference marked. **b** Corresponding left "pararectal" MRI cut

Fig. 9 a Hypogastric artery and its distribution in the pelvis: behind, middle rectal artery (*a*), in front of it, the (*b*), uterine (*c*) and inferior vaginal obturator arteries (*d*). *u* ureter. **b** MRI cut, *1* hypogastric "bifurcation" *2* piriformis muscle. Left "hypogastric" MRI cut. The IHP is located inside the circle, between its three limits: *a* in front the posterior superior edge of the internal obturator muscle; *b* above the visceral peritoneum with its intestinal loops; *c* behind and below the levator muscle of the anus

called "trigone" reference cut (Fig. 10a, b). The trigone cut allows us to identify the two vesical, medial and lateral groups.

Discussion

For many years ago, numerous authors have reported urinary complications after a hysterectomy. The authors estimate their frequency at 30% [18] to 60% of cases [6]. We set ourselves the target of elucidating the cause, which leads to complications of this kind.
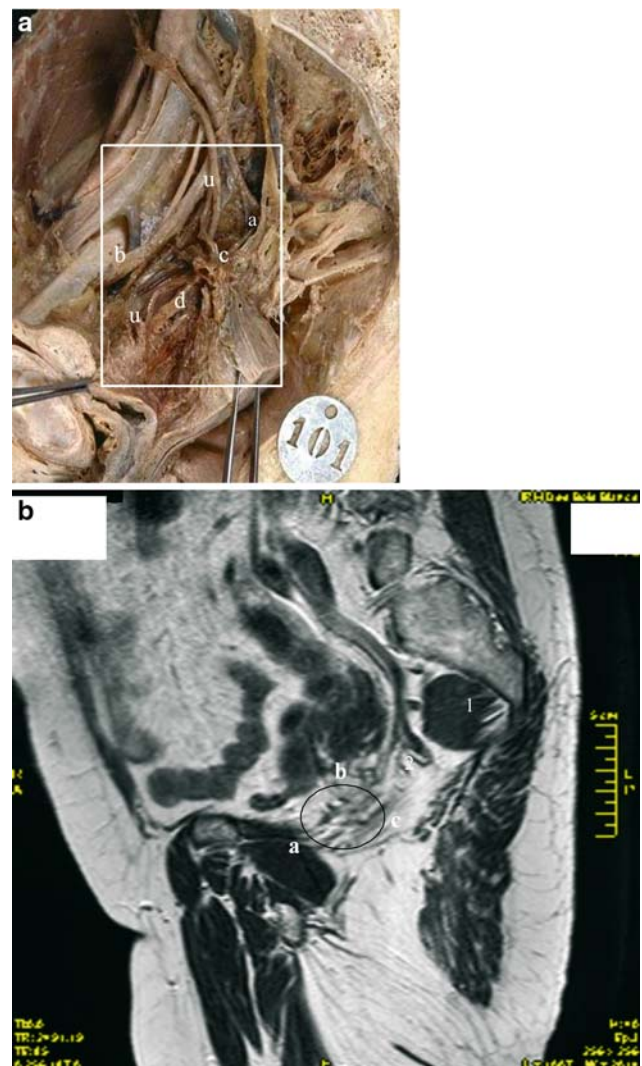
Our bibliographical study is short and focussed as it covers only recent research (between 2000 and 2005).

In anatomical surgical terms the pelvic ureter is the fundamental positional reference for the IHP:

– behind, the ureter's point of entry into the posterior layer of the broad ligament, when it enters into the base of the parametrium, always exactly matches the anterior inferior angle of the IHP, in other words its top.
– in front, opposite its intersection with the uterine artery. It is underneath and at the point of contact with this intersection that the two lateral and medial trunks which lead to the vagina and bladder come
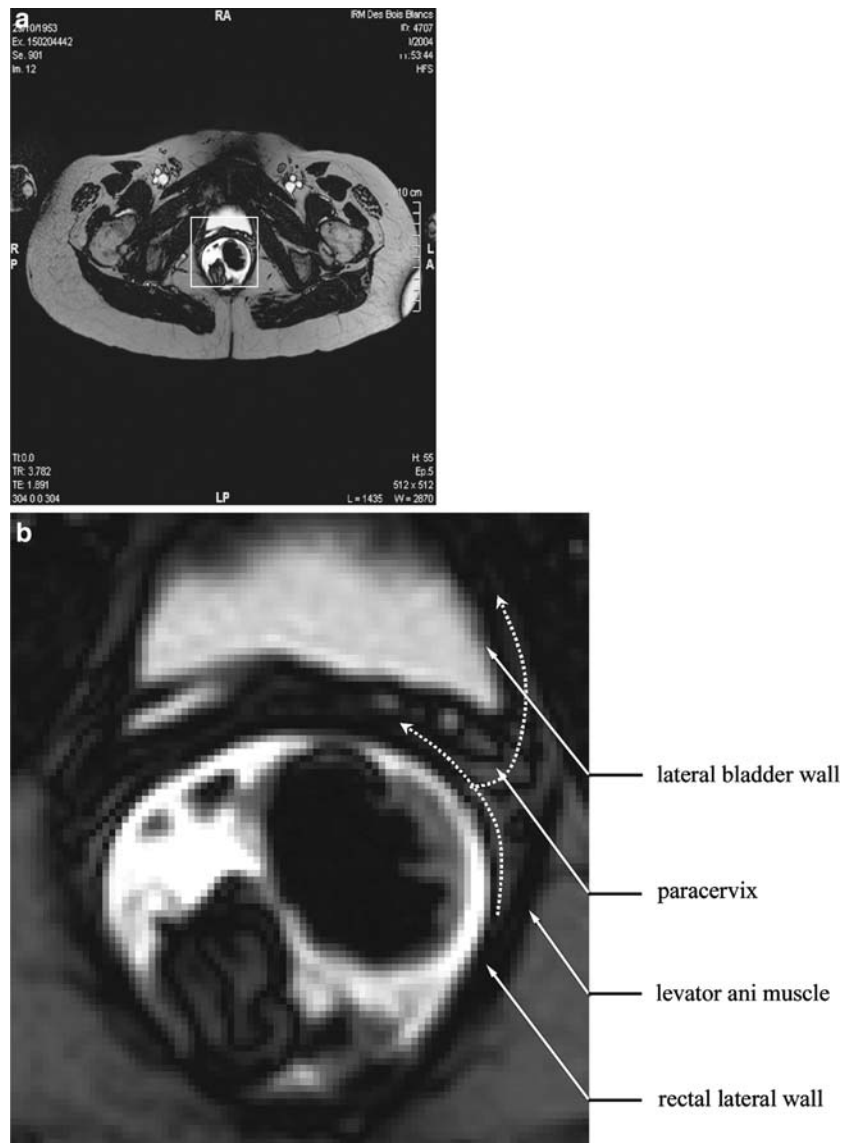
out of the top of the IHP. This surgical point of reference is of vital importance in nerve sparing during the course of a hysterectomy. Any dissection performed underneath the ureter inevitably leads to the risk of a nerve lesion. More particularly in its ligament portion, any lateral and inferior dissection leads to impairment of the vesicoureteral plexus and its branches leading to the urethra. Trimbos' studied backs up our conclusions [17].

However, in his anatomical approach, Kato observed the plexus in the lateral ligament of the rectum, of the paracervix and of the lateral ligament of the bladder. He did not believe that the parametrium contains any nerve structures [13].

Delmas [9] showed another anatomical point of reference during the course of his dissections: the deep uterine vein must be identified. It sets the lower limit of the exeresis if the carcinological constraints are adhered to Delmas'. We verified the accuracy of this statement. Baader [3] reached the same conclusions in his latest article on the innervation of the female pelvis.

Our findings appear to allow us to specify the systematisation of the efferences of the IHP. They are conventionally described in the form of five secondary plexuses: medium and inferior rectal, uterovaginal, vesical and erector [12]. In reality it appears that we can make certain alterations to this description. The dissection of our 22 specimens actually allows us to describe three efferent plexuses:

– a vaginorectal plexus, which is medial (in relation to the intersection between the ureter and the uterine artery), a satellite of the uterine artery, it divides into two groups, anterior thin, vaginal and posterior voluminous with a superior rectal destination.

– a vesical plexus, which is lateral, a satellite of the ureter, divides into two lateral, vesical and medial, trigonal groups.
– an inferior rectal plexus is made up of branches rising from the inferior edge of the IHP. It will be the subject of a subsequent description.

In a morphometric study carried out by means of a computerised three-dimensional reconstruction of the IHP of a human foetus, Delmas [11], also found efferent branches distributed to the uterus opposite to the isthmus, in the supravaginal part of the neck, to the vagina and to the dorsal surface of the bladder.

Baader [2] confirms that there is direct innervation of the bladder by efferent fibres from the IHP. What is new in our study is the fact that this vesical innervation is performed by two nerve groups, diverging on either side of the urethrovesical junction, the lateral and medial vesical nerves.

Iatrogenic lesions of the IHP during the course of pelvic surgery are recognised. Its deep topography in the pelvis makes it difficult to dissect [2]. The IHP is located in a fibrofatty filament, which is paramedian and paired [16].

Butler-Manuel [6] performed an immunohistochemical study and quantified the nerve tissue in the uterosacral ligaments and in the cardinal ligaments. He showed that the nerve section of the IHP was larger in a radical hysterectomy than in a simple hysterectomy [7].

Beneditti-Panici [4] found a correlation between the height of the resected paracervix and the occurrence of vesical functional disorders: the chosen resection limit being 2.7 cm.

Trimbos [17] suggested new nerve sparing techniques and confirmed their effectiveness in preventing postoperative complications. Picking up on his results, Maas [15] confirmed that sectioning the uterosacral ligaments also sections the most of the hypogastric nerve and suggested a partial section of the IHP at its anterior pole, which would lead to fewer urinary complications.

The limits of the hysterectomy

As far as possible we need to preserve the vesicovaginal efferences. The releasing of the vesicouterine and then vesicovaginal spaces should be performed on the median line, inside the pillars of the bladder, up to the intravaginal portion of the cervix uteri. Here the dissection is performed without difficulty and with no risk of lesions to the IHP. The haemostasis of the uterine pedicles is conventionally performed on the lateral edge of the uterine isthmus. The ligature of the cervicovaginal vessels is performed underneath this pedicle, vertically and without any particular problems [10].

So the efferences of the IHP lead into the vesicovaginal septum and the rectovaginal septum. This means that the cleaving of the vesicovaginal septum must be performed in its environment in order to preserver the medial vesical efferences as far as possible. Any dissection performed:

– outside of the ureter and in front necessarily involves a risk of lesions to the lateral vesical efferences.
– at the level of the intersection of the uterine artery and the ureter, any invasive dissection performed on the inside and underneath the intersection is likely to cause lesions to the vaginal efferences.

So the IHP's anterior, fundamental positional reference is the pelvic ureter at the point where it enters at the base of the parametrium, then at the crossing point of the uterine artery. The ureter is the vector for vesical efferences, located both underneath and outside of it. The uterine artery is the vector for vaginal efferences, which are thus sent into the vesicovaginal septum and the rectovaginal septum.

These points of reference are constant and it should be possible to spare the nerve efferences during pelvic surgery if the carcinological imperatives allow this.

Applications in imaging

The MRI study of the IHP allows us to follow the path of the IHP perfectly at all stages of the pelvis. Based on series of standard cuts in the three planes of space, we can easily select four marked, reproducible cuts:

The "pararectal" cut
The "hypogastric" cut
The "uterosacral" cut
The "trigone" cut.

These series have been performed on female patients who have not undergone hysterectomies.

It would be interesting to reproduce these MRIs with female patients who have undergone hysterectomies. It also seems reasonable to assume that the path of the IHP could be altered in those who present urinary complications.

There is no precise radiological study of the inferior hypogastric plexus in French and international literature.

Comparing the TSE T2 and BFFE images led us to choose the latter as their higher contrast and easier marking of the vascular pedicles gave us a better

definition of the anatomical areas in which the IHP needed to be marked out.

Even so, it should be possible to improve the accuracy of the images still further. 3D sequences of the Ciss 3D type specifically used in the imaging of nerve structures could be tried. This is also the case with unconventional acquisition planes including oblique planes, in the main anatomical axis of the IHP or above all in the plane of the uterosacral ligaments which are easily individualized in MRI in the sagittal or axial planes. The reason we did not choose them in this first part of the study was because of the potential difficulty in analysing them when there are none of the usual radiological points of reference.

Likewise it seems obvious that an MRI study with an endovaginal coil, made using the same method as in the study protocols for the bladder and uterine support structures [1, 8, 14] would allow us to obtain more accurate images of this anatomical region and perhaps even of the vascular-nervous plexuses.

Conclusion

The IHP is located level with the lateral part of the posterior floor of the pelvis, opposite the sacral concavity. On the middle floor the vesicovaginal efferences originate level with the paracervix. The ureter, which is the fundamental anatomical surgical point of reference, represents the upper limit of the IHP and of its vesical, vaginal and rectal efferences. Crossing this limit leads to the risk of nerve lesions to the efferences of the IHP. They lead to functional consequences involving the denervation of the anterior floor.

The MRI gives us a good anatomical radiological correlation thanks to simple points of reference. Even so, it would be interesting to continue with this work by always performing an MRI after a simple hysterectomy. We can also envisage refining research into the IHP by using other sequences such as the Ciss 3D sequence, which has already been exploited in the study of nerve structures and perhaps using unconventional oblique acquisition planes.

There are strong grounds to suggest that a modification of our reference cut after a hysterectomy would have functional repercussions. A correlation between the imaging and the functional disorders still needs to be assessed.

A better knowledge of the IHP allows us to get a better understanding of its possible iatrogenic nerve lesions over the course of a total simple hysterectomy. It explains the urinary repercussions downstream. We have carried out this work in such a way as to suggest a

systematisation of the efferences of the IHP, a description of which is given in another publication.

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