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Ibn Zuhr's Contributions to Surgery

FARID SAMI HADDAD

Ibn Zuhr comes from a famous Andalusian family of seven physicians who belonged to six generations. The origin of the bani Zuhr family can be traced back to the Tihāmah region on the Red Sea Coast of the Arabian Peninsula. The banu Zuhr physicians served in Ishbilyah [Sevilla] from about 1005 AD to 1205 AD, a period of 200 years. Abu Marwān ibn Zuhr belongs to the middle generation and is the most famous of the seven [1].

Abu Marwān ibn Zuhr (1091 - 1162 AD) wrote at least six books of which his *al-Taysir* remains the most famous and one of three that were translated into Latin; it was translated twice, the first time around 1160 AD by John of Capua and the second time about 1280 AD by Patavinus (Paravicious or Paravicinus) a physician of Venice. Between 1490 and 1628, a period of 138 years, it was printed in Latin 11 times and was used as a textbook of medicine in European Universities for a very long time all the way through the 18th century.

Ibn Zuhr's *al-Taysir* became recently available to the public when the late Dr. Michel al-Khouri edited the original Arabic text and when the "*al-Munazamah al-ʿArabiyyah li'l Tarbiyah wa'l Thaqāfah wa'l ʿUlūm*" [Arab League Educational, Cultural, and Scientific Organization] posthumously published it in 1983 in Damascus [2]. The book is a practical compendium on Medicine as ibn Zuhr exercised it. The book has two parts (232 & 195 pages) and a *jāmiʿ* [compendium or antidotarium] [ref a, b, d, e]. The editor has appended indices (69 pages) of medical terms, simple drugs, compound drugs, names, and subjects.

The book is almost unique in that it contains fewer references than most other similar Arabic medical texts:

27 references to Galen

11 to the author's father, abu al-ʿAlāʾ (d 1131 AD)

10 to Hippocrates

4 to the author's grandfather, abu Marwān (991 - 1077 AD)

1 to Aristotle

\* Carl T Hayden Veterans Affairs Medical Center, Phoenix, Arizona, U. S. A.

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الجامعة العربية للتربية والثقافة والعلوم

# كتاب النَّسِيرِ فِي الْمَدَاوِلِ وَالتَّدْبِيرِ

لأبي برزان عبد الملك بن زهر

٢-١

تمت  
المصوم الدكتور ميشيل الكنعاني  
عضو مجمع اللغة العربية بدمشق

تقديم  
الدكتور محيى الدين مناصر  
المدير العام للمخطوطات العربية في المكتبة الوطنية بالعلم

## 1. - Title page of *al-Taysir* by ibn Zuhr

But none to abu Al-qāsim Al-zahrāwī [Abulcasis] (936-1013), the greatest Arab surgeon [3 - 11], who lived near Cordoba some 150 years before ibn Zuhr. It is very surprising that ibn Zuhr does not quote abu Al-qāsim, does not mention him nor does he discuss any of his important contributions to surgery. We have not found an explanation to this fact.

Although ibn Zuhr was primarily a physician, a famous clinician, and a great master of medical treatment, he was never known as a surgeon. But from a perusal of his book *al-Taysir*, one finds that he discusses several interesting surgical diseases and other medical entities which are considered today to be surgical diseases, some of which he describes for the first time; he develops new instrumental therapeutic maneuvers and he experiments

on animals trying new surgical operations. By his own admission, he was keenly interested in surgery. One cannot fail but get the impression that he also was a master of surgical management. His surgical horizon extended far and wide, from the nose to the lower extremities passing by the pharynx, vagina, urethra, anus... The surgical diseases discussed by ibn Zuhr can be divided into three categories depending on how he advocated their treatment. Diseases in the first category were treated medically by drugs and diet; diseases in the second category were treated by instrumental manipulation and diseases in the third category were treated by operative surgery.

A. - The first category of surgical diseases which were treated by drugs and diet, includes:

1. - *Swelling of the tongue* - Macroglcssia, tumors, and neurological affections (both sensory and motor) are included (p. 43).
2. - *Swelling of the uvula* (pp. 44 & 144).
3. - *Intestinal obstruction* - In this section, ibn Zuhr describes infection and gangrene of the bowel and their medical treatment (p. 102).
4. - *Colocutaneous fistula* - He observed a case which he describes as follows: "trauma to the abdomen can heal or can be fatal. I have observed a man who defecated from a wound he had previously sustained; he survived for a long time, and was gainfully employed" (p. 199)

وشاهدوه في الناس وفي الحيوانات . وأما أنا فرأيت رجلاً كان يتغوط من جرح كان أصابه ، وبقي كذلك مدة طويلة ، وكان يتصرف في طلبه الرزق كثيراً وتمادت حياته ، غير أنها كانت حياة سوء . وقد أتيت على (ذكر) (٣٥٦) هذه الأعضاء ، فأنا آخذ في ذكر المعدة (٣٥٧) إن شاء الله .

## 2. - Colocutaneous fistula from *al-Taysir* page 199.

5. - *Sterility* - He distinguishes between congenital and acquired sterility; he mentions the fact that, at first, he was himself sterile but later, after he suffered from a severe fever, he begot several children (pp. 282 - 4) .

6. - *A sclerosing lesion of the penis* - He describes, for the first time, a sclerosing lesion of the penis: "Curvature of the penis may result from an excess of dryness or a tumefaction; the cure of the curvature resulting from excessive dryness is almost impossible, nevertheless, I prescribe the use of almond liniment in warm water many times a day so that the penis is always humid from the ointment and the water" (p. 299); today we still use massaging the lesion several times a day, but the disease is called "de La Peyronie's disease" because it has been assumed that it was originally described, for the first time, by François de La Peyronie (1678 - 1747)

in 1743 as "induration plastique des corps caverneux"; however, we have now evidence that ibn Zuhr described it around 1143 i.e. 600 years before "de La Peyronie"! It should be, henceforth, called "ibn Zuhr's disease" or "Avenzoar's disease".

تقوس<sup>(٦٤)</sup> ( لتورم يكون )<sup>(٦٥)</sup> في وتراته أو لإفراط جفوف يصيبها . أما انقطاع الشكال فأمرٌ ممتنع العلاج لنزارة قدره وربما برىء . وأما مايكون عن تقوس يعرض فيه فالتقوس إما أن يكون عن إفراط جفوف ، وإما أن يكون عن تورم . فما كان عن جفوف فيكاد أن يكون البرء ممتنعاً ، لكن مع ذلك أمر بأن يدهن بدهن اللوز مضروباً بالماء الفاتر كل يوم مراراً كثيرة حتى لا يخلو عن رطوبة الدهن والماء . وأما ماكان من تورم متحجر فيما هنالك فإن دهن الشبث وشحم البرك ودهن السوسن ومُخ ساق الإبل أجزاء متساوية ، إذا دهن بمجموعها<sup>(٦٦)</sup> كل يوم مراراً ظهر الانتفاع به . وقد ذكرت أمراض القضيب ، فأنا آخذ في ذكر الأرحام والفروج .

3. - de La Peyronie's disease from *al-Taysir* page 299.

7. - *Gynecological diseases* - In this section, ibn Zuhr discusses the physiology of the uterus and its function during labor; then he discusses, at great length, the subject of female sterility and its treatment with medicines, diet and vaginal douching; he then treats the subject of uterine tumors, uterine gangrene, prolapse and amenorrhea. For excessive uterine bleeding, also called menometrorrhagia, he advises to add to the regular diet Palestinian melon (p. 311). He then discusses the pathology of the vulva and of the vagina including congenital anomalies and inflammations (pp. 299 - 314) .

8. - *Varicose veins* - For varicose veins, syrup of camomile (flowers or blossoms), melon seeds and honey are recommended (p. 370).

9. - *al-Nughlah* - Another surgical disease described for the first time by ibn Zuhr is "al-Nughlah" which has been previously thought to be mediastinitis. Here is what ibn Zuhr wrote about it : "... stress is a big factor in the etiology of al-Nughlah as happened to my father when he suffered at the hands of 'Ali ibn Yusuf, he developed al-Nughlah on the left side where it spread vertically about a hand span; the area became insensitive, his treating physician was able to carve it out without my father feeling that; it continued to spread until it reached the heart; his respiration became labored and he died within two days" (p. 382). This seems to be an acute gangrene or fasciitis of the chest wall rather than mediastinitis !

أن تكون لا بُرء لها وإنما تعرض لمن أسنَّ . وأكثر ماتكون إذا تعرض للإنسان أنكاد وكان يكثُر الفكرة وتتوالى عليه الهموم ، كالذي أصاب أبي رحمه الله عندما ناله من عليّ بن يوسف ( ماناله )<sup>(٨٢)</sup> ، فإنه اجتَرقت<sup>(٨٣)</sup> أخلاطه فأصابته نُغْلَةٌ في الجانب الأيسر وامتدت طولاً نحو الشبر . ثم عاد الموضع لا يُحسّ ، وكان المتولّي لعلاجها يقطع أجواف النُغْلَة فلا يُحسّ بذلك . ولم يزل الأمر كذلك حتى وصل بالاتصال مضار ذلك إلى قلبه ، فعرضه سوء تنفس نحو يومين ومات رحمه الله .

4. - Al-nughlah from *al-Taysir* page 382.

10. - *Hemorrhoids* - Ibn Zuhr treats hemorrhoids with a concoction of basil, pomegranate, iron dust, vinegar, sugar and honey, and sometimes glycyrrhiza (licorice) is added (pp 460 - 1).

11. - *Dental pathology*- The section on Dentistry includes loose teeth and caries. Ibn Zuhr recommends the use of root of asparagus (blackberry or birdwind) water or dilute tar as a mouth wash and powdered carnelian for the arrest of caries especially in their early stages (pp 44 - 5).

B. - In the second category, surgical diseases are treated by special instruments, supplies (syringes, cotton etc) or by manipulation; these include:

1. - *Tubes for feeding the patient whose deglutition (swallowing mechanism) is paralyzed* - Ibn Zuhr writes that sometimes the mechanism of deglutition becomes paralyzed either gradually or acutely; this is often a neural affection which first manifests itself by a difficulty in swallowing which gradually worsens until the patient is no longer able to swallow; at first, there might be mild pain, soon, however, the pain abates, but the patient remains without food and without medication, his force diminishes, cachexia sets in and a new strategy becomes necessary; this consists in the introduction of a tube either made of silver or a malleable metal; its proximal end should be wide like a funnel. Ibn Zuhr then describes how the tube is introduced until it reaches the stomach and then milk and soup can be poured in (pp 154 - 5).

أغذيته بسبيل<sup>(٥٨)</sup> آخر . والسبيل في ذلك إما أن يُتَلَطَّف فيُدخل في حلقه رويداً رويداً أنبوبٌ إما من فضة وإما من قصدير مشدود ، ويكون آخر الأنبوب واسعاً جداً مما يلي المُحاول لذلك بيديه . ولأول مايرام إدخال الأنبوب تنهوع معدته طبعاً ، فلذلك يجب أن يُدس منه شيء ثم يُخرَج ( قلدر مايسكن ذلك )<sup>(٥٩)</sup> ، ثم

يُدسَّ هكذا حتى تعهد<sup>(٦٠)</sup> الأعضاء ذلك ولا تنفّر منه ، فيُصبَّ في الطرف الواسع الذي ( يلي )<sup>(٦١)</sup> الرجل المحاول لبن حليب أو حسو ليصل إلى المعدة فيغتذي به ريشما يعالج السبب الممرض فترفع الشكوى . غير أن هذه يتوقع منها أن تُخلَّ

5. - Feeding tube from *al-Taysir* pages 154 - 5.

2. - *Nutrient enema using the bladder of a goat as an enema container* - A silver tube is attached to its mouth and the tip of the silver tube is introduced into the rectum; the contents of the container whether milk or soup are thus introduced into the rectum; some of this liquid is absorbed in the gut which thus obtains some nutrition (p. 155).

زعم<sup>(٦٢)</sup> شيء تغتذي الأعضاء به ، وهذا وجه ضعيف . والسبيل ( القاصد )<sup>(٦٤)</sup> الذي يقع الاغتذاء به بلا شك ولا مرية أن يوضع لبن أو حسو في مائة عنز أو غيره ، ويربط في فمها أنبوب فضة<sup>(٦٥)</sup> ويدس طرف الأنبوب في المقعدة ويشد على المثانة ، فيندفع ما فيها إلى المعى (المسمى)<sup>(٦٦)</sup> المستقيم ، فينال المعى من ذلك بعض الاغتذاء ويمتصه عنه ، ويحتفظ منه المعى الذي فوقه فينال منه بعض

6. - Nutrient enema from *al-Taysir* page 155.

3. - *Manual reduction of hernias and the use of hernial trusses* - In his discussion of hernia, he mentions that it could be caused by trauma (direct trauma or following a jump on a full stomach) or by chronic cough. He recommends the avoidance of coughing, sneezing and raising the voice; the hernia should be reduced and a truss should cover the hernial orifice (p. 196).

4. - *Syringes for irrigation in various gynecological diseases* - He mentions irrigation of the vagina at least four times (pp. 301-7); he uses a solution of ambergris (p. 301), or liniment of bitter almonds in oxymel syrup for sterility (p. 303); for uterine tumefactions, he recommends irrigation with oil of roses (p. 306) and if the tumefaction becomes purulent, he then recommends irrigation with a watery solution of honey, honey alone or a concoction of powdered barley, vetch, cypress cones, frankincense and honey (pp. 306-7); for painful cancerous growths oil of roses and / or cream of egg albumen are recommended (p. 307).

القضاء . وأحقين المرأة بزيت الورد الذي أسميه زيت ورد ، فإن ارتفع ذلك فأمر جليل قد أتته ، وإن آل إلى التقيح فلا بد حينئذ من استعمال الاحتقان بماء العسل وبالعسل نفسه . فإذا نقى العضو من المدة فإنك حينئذ لابد أن تأمر بحقه بعسل

قد اكتسب قوة من ( قوى الأدوية )<sup>(٥٢٣)</sup> المجففة التي شأنها أن تنبت اللحم ، وفي العسل نفسه من القوة المنبئة للحم حظ ليس باليسير .

7. - Vaginal douching from *al-Taysir* page 306.

5. - *Cotton in the reduction of uterine prolapse* - The cotton is immersed in a warm solution of oil of roses and oil of lilies (p. 309).

وأما إن كانت الرحم بالهواء قد تغيرت بعض التغيير فيجب أن تحمل عليها وهي من خارج قطناً كثيراً مغموساً في زيت ورد ودهن سوسن بشطرين بعد تدفئتهما حتى عادا كاللبن<sup>(٥٤٨)</sup> حين يجلب ، يتردد<sup>(٥٤٩)</sup> القطن بذلك متى رفع<sup>(٥٥٠)</sup> واحد وضع آخر هكذا حتى يذهب ما قد حدث ولحج في العضو ، فعند ذلك يرام إعادتها إلى موضعها وتعالج بما ذكرته من العلاج دون إغفال شيء منه . وذكر الأطباء أنه قد تعفن معاليق الرحم فتسقط وتبقى المرأة حية لا يضرها ذلك ( في معاشها .

8. - Cotton in the reduction of uterine prolapse from *al-Taysir* page 310.

6. - *Manual reduction of fractures* - He gives a perfect description for the reduction of fractures on a flat surface with the use of both hands, first separating the broken fragments, then reducing the fracture very carefully letting the muscles bring the fragments together and then immobilizing the fracture in a special splint made of bamboo sticks after covering the skin with a layer of oil; the bamboo sticks are fashioned into a splint and secured with a bandage which ought to be moderately tight, not too tight nor too loose; the splint should be frequently replaced and the area inspected; he also mentions the necessity of having an experienced assistant or several assistants for difficult fractures; he does not omit dietary suggestions (pp. 314 - 8).

7. - *Cotton in the stabilization of fractures of the nose* - He uses a cotton mold inside the nasal cavity and an external splint. He changes the mold frequently and irrigates the nose with water and honey to remove the secretions (pp. 317 - 8).

وأما إن كان التكسر في الأنف فلا بد ( لك )<sup>(٦١٦)</sup> إن كان قد آرتص كله من قالب تدسه فيه مما له منفعة<sup>(٦١٧)</sup> ، ويكون ذلك من قطن مفتول . ولا بد لك من خارج مما يمسكه ، فليستخذ من الصمغ على خرقة متينة مطوية على طاقات ملزوقة طاقة إلى طاقة حتى يكون لها غلظ ، فتضع بعضها على الأنف من فوق الكسر بكثير ومن تحته بكثير ، بعضها من الجانب الأيمن وبعضها من الجانب الأيسر كذلك ، وتلزمها<sup>(٦١٨)</sup> على الأنف وتتفقداه بعينيك من خارج . فإن أمد

9. - Cotton mold in nasal fractures from *al-Taysir* page 317.



8. - *Manual reduction of dislocations* (pp. 318 - 9).

C. - In the third category, he describes surgical operations for the treatment of a variety of diseases; this category includes :

1. - *Ophthalmic operations for the treatment of meibomian cysts, trichiasis, cataract and foreign bodies in the eye* - In this relatively long section ( 30 pages: from p. 47 to p. 76), ibn Zuhr also discusses anatomy of the eye, lice of the eyelashes, strabismus, inflammations (dacryocystitis) ulcers, pupillary lesions, and optic atrophy.

2. - *Tracheostomy for the relief of laryngeal obstruction, as from laryngismus stridulus* - He had experimented with tracheostomy on goats " When I was a student,... I would incise the trachea of a goat after having incised the skin and the subcutaneous fascia, then I would remove a piece of trachea smaller than a lupine seed then I would irrigate the wound with water and honey..." (pp. 149 - 50).

كنت في وقت طلبي إذ قرأت هذه الأقوال ، شققت قصبة (رئة) (٢١) عنز (٢١) بعد أن قطعت الجلد والغشاء تحته وقطعت من جوهر القصبة قطعاً باتاً (٢٢) دون قدر الترمسة ، ثم التزمت (٢٣) غسل الجرح بالماء والعسل حتى التأم ، وأفاق (٢٤) إفاقة كلية وعاش مدة طويلة وعندما أخذ الجرح في الانكماش والاندماج ، كان يُدّرر عليه جوز السرو مسحوقاً منخولاً حتى أفاق ، ولكن هذا شيء لم يستعمله أحد ممن ( لحقناه ومن ) (٢٥) لحقه سلفنا فلهمذا لم أذكره بدءاً .

10. - Tracheostomy from *al-Taysir* pages 149 - 50.

3. - *Operations for abdominal and intestinal trauma* - He is one of the first to suggest the use of silk in suturing the traumatized abdominal wall and traumatic lesions of the bowel as well as bowel resection when a segment of bowel is not viable ( p. 198).

ذِكْرُ جراحاتِ البَطْنِ (٣٤٢)

ويعرض في البطن الجرح إما بحديدة (٣٤٣) (أو بخشبة حديدة) (٣٤٤) تشق جلدة البطن والمراق معاً فيبرز الثَّربُ (٣٤٥) وعن بروزه يجب أن يصرفه صانع اليد . وإن أصابه تراب أو غبار أو نشارة خشب فيجب أن يغسل ذلك عنه بماء فاتر ثم يصرفه برفق ، فإن تمزق منه جزء أو اسودَّ فالحزم أن يقطع عنه ماتمزق وفسد ثم يصرفه إلى البطن ويخيط عليه ( بخيط حرير ) (٣٤٦) إبريسم . وصانع اليد (٣٤٧) كفيل بعمل ذلك ، وإنما (أعرفه) (٣٤٨) علماً لا عملاً ، ويضع على الخياطة ما يعين على الالتحام . ومع ذلك فيجب بسبب (٣٤٩) الجرح أن

11. - The use of silk suture for wounds of the abdomen and bowel resection from *al-Taysir* page 198.

4. - *Urethrolithotripsy for urethral stones* - He is a pioneer in the description of the use of a diamond tip for breaking stones in the urethra " A very fine sound with a small diamond on its tip is introduced until it reaches the stone which is fragmented by the contact" (p. 297); this is a precursor of modern day lithotripsy .

ذِكْرُ مَا يَعْرضُ فِي الْقَضِيْبِ (٤٠١)

والقضيْب يصيبه في المجرى السَّدة ؛ إما لحصاة وإما لقرح غليظ أو لدم عبيط . فما كان عن حصاة فإن القثاطر (٤٠٢) نافعة في ذلك ، وإن دَسَّ إلى الحصاة ميل رقيق في غاية الرقة في طرفه حجر صغير من حجارة الماس فإنها عندما يمسُّ فيها تتفتت الحصاة . وللدُّهن البَشَامِي اختصاص في تفتيتها وكذلك لدهن

12. - Diamond tip for lithotripsy from *al-Taysir* page 297.

5. - *Hysterectomy for uterine lesions* - This is the surgical removal of the uterus, which is among his innovations in the surgical field (pp. 149 - 50 & 299) .

6. - *Drainage of abscesses* - A special section is devoted to the discussion of abscesses, ulcers (including the rodent ulcer), skin inflammations in their various types such as erysipelas, anthrax etc and pruritus and their different treatments including poultices that help ripen an abscess ( pp. 327 - 37 ) .

The name given by ibn Zuhr to surgery is : "a'māl al-yad" [hand work] and he calls the surgeon: "Šāni' al-yad" (manual artist) an obvious translation from the Greek, originally made by Ishāq ibn Hunayn and also used by al-Zahrāwī . It seems that the word "jirāḥah" was first used by al'Aynzurbī [c].

Unlike his father who believed that surgical operations should be left to the assistants , ibn Zuhr liked surgery and liked to perform surgical operations " As for me, I had a psychological affection , I liked hunting and the experimentation with medications... all this manually; I was so infatuated with this that I considered it an affliction which led me into this path by a strong desire, although it was somewhat demeaning, however I thoroughly enjoyed these exercises, just as someone else might enjoy gardening or falconry. I mentioned some surgical procedures because the physician might be obliged to perform whatever he can of simple surgical procedures " ( p. 320 ) . He actually started to perform experimental surgical operations on animals when he was still a young lad; he had then the occasion to study the healing power of the trachea by performing a tracheostomy on a goat and subsequently observing how the tracheal wound healed (pp. 149 - 50) .

برحمة الله ، وكان بعيداً من مهنة<sup>(٦٣٨)</sup> الأعمال . وأما أنا فإنّ في نفسي مرضاً من أمراض النفوس من حب أعمال الصيد لانيين وتجربة الأدوية والتلطّف في سلب بعض قوى الأدوية وتركيبها في غيرها ، وتمييز الجواهر وتفصيلها ومحاولة ذلك باليد . وما زلت مغرماً بذلك مبتليّ بحبه ، فسلكت هذا المنهاج شهوة فيه وإن كان على ما هو عليه من الامتحان ، غير أنّي ألتذّ بعمله<sup>(٦٣٩)</sup> كما يلتذّ غيري بالفلاحة وبالقنص . وإنما ذكرت من أعمال اليد ما ذكرت لأنه إذا اضطرّ الطبيب في نفسه أو فيمن يحضره ممن يغتم الأجر فيه لابدّ<sup>(٦٤٠)</sup> أن يعمل ما يحسن عمله ممّا خفّ ، وأما ما يكون من الأعمال المستنيرة القبيحة ، كالشق على الحصى<sup>(٦٤١)</sup> ، فإنّ الحر لا يرضى لنفسه بعمل ذلك ولا بمشاهدته ، وما أظن أن الشريعة تبيحه إذ فيه كشف العورة وكشفها حرام.

13. - Ibn Zuhr liked surgery from *al-Taysir* page 320.

Ibn Zuhr has expounded his views on the relative value of theory and experience; he definitely favors observation and the experimental approach over theoretical considerations which he calls "safaṭah" Talk is composed of truth and falsehood and some arguments are proof, others persuasions, others sophistry and still others imaginary . Proof is a just balance in arguments ... When one is versed in logic especially if one is a physician, only then can one distinguish between truth and falsehood; ... experimentation alone can establish truths and demolish falsehoods" (pp. 326 - 7).

وكذلك مثل ما ذكرته في كتابي هذا وأثبتته لا شك أنه سيروم من يتعسف تزيفه بالكلام وأنا أحاكمهم ، كنت حياً أو ميتاً ، إلى التجربة فإنّ الكلام يدخله الصدق والكذب ، والحجج منها ما هو برهان ومنها ما هو إقناع ومنها ما هو سفسطة ومنها ما هو تخيل<sup>(٦٤٢)</sup> . والبرهان هو ميزان حق في الحجج ، لكن كثيراً ما تدخل فيه أقوال (إما جدلية إقناعية وإما سفسطة وإما أقوال تخيلية ، وليس يفرق بين الأقوال)<sup>(٦٤٣)</sup> إلا البصير بعلم المنطق وخاصة إن كان بصيراً بعلم الطب ، فحينئذ يمكنه أن يميز الحق من الباطل فيما يكون له بالطب معلق . وكثيراً (قد يُسموه)<sup>(٦٤٤)</sup> عليه من شأنه الحاجة ، والتجربة وحدها هي التي تثبت الحقائق وتذهب البواطل .

14. - Experimentation vs sophistry from *al-Taysir* page 326.

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